

Rock Products

with which is incorporated

CEMENT and ENGINEERING NEWS

SEPTEMBER
1934

Founded 1896

THE OLDEST PUBLICATION IN ITS FIELD AND THE RECOGNIZED AUTHORITY

100% ADVERTISING SPACE!



NEVER BURST

IMPROVED

MULTI-WALL

No matter which of the six sides of IMPROVED Multi-Wall Valve Bags are exposed, they display your advertising message—because all six sides can be printed.

Contractors, engineers, builders, architects see your name, trade-mark and other advertising on the job. These men readily recognize the greater strength of these bags—admire the ease of handling—solid and even stacking feature—the more positive closing valve—the multi-seal which guards against moisture, etc.

WRITE FOR COMPLETE DETAILS.

FACTORIES

Buffalo Philadelphia Minneapolis
Dallas Goshen, Ind. St. Louis
Toledo Milwaukee Kansas City
Chagrin Falls, O. New Orleans

CHASE BAG Co.

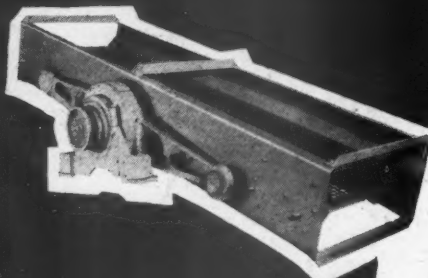
TOLEDO, OHIO

SALES OFFICES

Chicago Los Angeles Denver
Detroit San Francisco Cleveland
New York Orlando, Fla. Memphis
Hutchinson, Kan. Charleston, S. C.

CIRCULATED TO MORE PLANTS THAN ANY OTHER PAPER IN THIS INDUSTRY

SAFETY JIGGER



ADJUSTABLE VIBRATION

This feature assures maximum screening efficiency regardless of material handled.

Vibrations are adjusted to screening requirements—increasing capacity—saving power—and making each screening job more profitable.

ABSOLUTE CONTROL

Vibrations are always under absolute control. Any variation in material can immediately be taken care of by controlling vibrations of screen—assuring absolute uniformity at all times. This feature plugs leaks in production cost and makes you a preferred product.

ENGINEERING SERVICE

JIGGER ENGINEERS are always at your service—ready to cooperate with you and show just how and why the SAFETY JIGGER will pep up production and return greater dividends on your investment.

PRODUCTIVE EQUIPMENT CORP.

210 E. OHIO STREET
CHICAGO, ILL.

CIRCLE
THROW
SCREEN

BEFORE YOU BUY ANY LOCOMOTIVE

Investigate these SHAY advantages

1. A powerful three-cylinder engine which starts heavy loads and hauls them wherever rails are laid.

2. A flexible driving shaft, and the fact that trucks are compensated for track inequalities assure dependable, free from derailment operation on uneven track.

3. A simplicity of construction, with all operating mechanism out in the open where it is readily accessible for lubrication, adjustment and repairs when needed.

Prospective locomotive purchasers should be thoroughly familiar with these Shay advantages. Write us for further details.

LIMA LOCOMOTIVE WORKS, Incorporated

Lima, Ohio

Sales Office: 60 E. 42nd St., New York, N. Y.



LIMA
Shay Geared **LOCOMOTIVES**



**RIGHT ON
THE BULL'S-EYE
OF VALUE**

THE NEW 5-TON GENERAL MOTORS TRUCK

***\$1,000
less than
the average
5-ton
truck***

Business men with 5-ton loads to haul will want to see, inspect and learn the facts about this big, husky money-maker. They can put it to work with full assurance that it will save time and save money, day after day, year in and year out.

Priced \$1000 lower than the average price of all other leading 5-ton trucks, this modern General Motors truck is truly an exceptional value. It has a GMC valve-in-head engine, of course . . . develops 94 horsepower and 230 ft. lbs. of torque. Valve seat inserts are of stellite, the carburetor is of the downdraft type, the rugged frame is 9" deep, the booster brakes have an unusually large braking area, and the brake drums are of cast nickel iron for greater economy. Add to these features a score of others, including full-floating rear axle, needle bearing universals and rugged spoksteel wheels—and the proof of this truck's overwhelming value is crystal-clear.

Whatever your hauling needs may be, there's a General Motors truck that fits exactly—one that's "engineered for the job" and therefore a more efficient worker and earner. Any GMC dealer will gladly tell you more or the facts will be mailed upon request.

GENERAL MOTORS TRUCKS and Trailers

GENERAL MOTORS TRUCK COMPANY

Time Payments Available Through Our Own Y. M. A. C.

PONTIAC, MICHIGAN

Recognised the World Over as the Leader in Its Field

Rock Products

With which is
Incorporated

CEMENT and ENGINEERING NEWS

Founded
1896

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September, 1934

TABLE OF CONTENTS

Recovery Progress—Trends	25-27
U. S. Government Engineers Design a Crushed-Stone Plant	28-31
<i>Tennessee Valley Authority's operation for making crushed stone coarse and fine aggregates for Norris dam covers considerable of the landscape and has interesting features. By C. H. Vivian.</i>	
Stock Piling and Storage of Aggregates in the Great Plains Region.....	32-35
<i>Where, when and how to use belt conveyors, locomotive and crawler cranes and drag scrapers. By John H. Ruckman.</i>	
Combustion Economy in the Rotary Cement Kiln.....	36-37
<i>Part II—Theory of combustion. By Robert S. Schultz, Jr.</i>	
Effect of the Granular Composition Upon Strength of Portland Cement	38-39
<i>By K. Koyanagi.</i>	
Planned Safety Campaign in Aggregates Plants.....	44-45
<i>How accident prevention is supervised at several sand and gravel and crushed stone plants of Gifford-Hill & Co., Inc. By E. P. Golding.</i>	
Code Developments	48
Bad Accident Record for Cement Industry in July	53
Further Developments in Grinding.....	56-57
<i>Data accumulated at Whitehall Cement Manufacturing Co. prove flexibility of original experimental installation. By Nathan C. Rockwood.</i>	
Directors of Crushed Stone Association Strong for Continuance of Promotional Work.....	59

Departments

Chemists' Corner	38-40
Hints and Helps for Superintendents.....	42-43
Financial News and Comment.....	46-48
Editorial Comments	49
Traffic and Transportation.....	50-52
Lime Producers' Forum	54-55
Cement Products	58-59
New Machinery and Equipment.....	60-63
The Industry	64-65
Digest of Foreign Literature.....	66
Classified Directory of Advertisers.....	68-70-72

(Rock Products is indexed in the "Industrial Arts Index," which can be found in any Public Library)

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INDEX OF ADVERTISERS

A	L
Allis Chalmers Mfg. Co.. 77	Leschen, A., & Sons Rope Co. Inside Back Cover
American Cable Co., Inc.. 24	Lewistown Fdy. & Mach. Co. 76
American Steel & Wire Co. 10	Link-Belt Co. 5-77
Audubon Wire Cloth Co.. 71	Lima Locomotive Works, Inc. Inside Front Cover
Austin - Western Road Machy. Co. 71	Ludlow-Saylor Wire Co. Inside Back Cover
B	M
Bacon, Earle C., Inc. 77	Marion Steam Shovel Company 13
Bartlett, C. O., & Snow Co. 77	McLanahan & Stone Corp. 77
Blaw-Knox Co. 75	Medart Co. 19
Bucyrus-Erie Co. 22-73	Morris Machine Works... 69
Bucyrus-Monighan Co. 73	Morrow Mfg. Co. 73
C	N
Cement Process Corp. 77	National Equip. Corp. 9
Chain Belt Co. 77	National Wire Cloth Co.. 76
Chase Bag Co. Front Cover	Northwest Engineering Co. 3
Chicago Perforating Co.. 78	O
Classified Advertisements	Ohio Power Shovel Co. 76
Classified Directory of Advertisers	P
Cross Engineering Co. Inside Back Cover	Pennsylvania Crusher Co. 78
D	Plymouth Locomotive Works
Dixie Machy. Mfg. Co. 76	Productive Equip. Corp. Inside Front Cover
E	Pulmosan Safety Equip. Corp. 72
Eagle Iron Works..... 78	R
Ensign-Bickford Co. 6	Raymond Bros. Impact Pulv. Co. 15
F	Robins Conveying Belt Co. 14
Fate-Root-Heath Co. 11	Roebbling's, John A., Sons Co. 8, Back Cover
Flexible Steel Lacing Co.. 75	Ryerson, Jos. T., & Sons, Inc. 77
Frog, Switch & Mfg. Co. 75	S
Fuller Co. 4	Smidth, F. L., & Co. 80
G	Smith Engineering Works 76
Gardner-Denver Co. 74	T
General Motors Truck Co. 1	Timken Roller-Bearing Co. 12
Goodrich, B. F., Rubber Co. 20-21	Traylor Eng. & Mfg. Co.. 7
Gulf Refining Co. 67	U
H	Universal Vibrating Screen Co. 72
Harnischfeger Corporation 17	Used Equipment
Harrington & King Perforating Co. 74	78-79
Hayward Company	W
Hendrick Mfg. Co. 74	Wellman Engineering Co. 75
Hercules Powder Co. 73	Wilfley, A. R., & Sons, Inc. 16
J	Williams Patent Crusher & Pulv. Co. 69
Jeffrey Mfg. Co. 23	Williamsport Wire Rope Co. 18
K	
Koehring Company	



THE CODE



The A. B. P. is a nonprofit organization whose members have pledged themselves to a working code of a practice in which the interests of the men of American industry, trade and professions are placed first—a code demanding unbiased editorial pages, classified and verified paid subscribers, and honest advertising of dependable products. The A. B. C. is an organization which audits and verifies publishers' circulation claims and records.

TO SUBSCRIBERS—Date on wrapper indicates issue with which your subscription expires. In writing, to have address changed, give old as well as new address

SHOVEL OBSOLESCENCE will eat up your profits!

THERE is something to be proud of in keeping a "grand old chariot" of a shovel running year after year—but pride never paid dividends and "grand old chariots" eat up the profits.

A modern plant won't balance up shovel losses! How about your pit?

How many men operate the shovel? One or three? How long do the cars or trucks wait?

Is the feed to the primaries continuous?

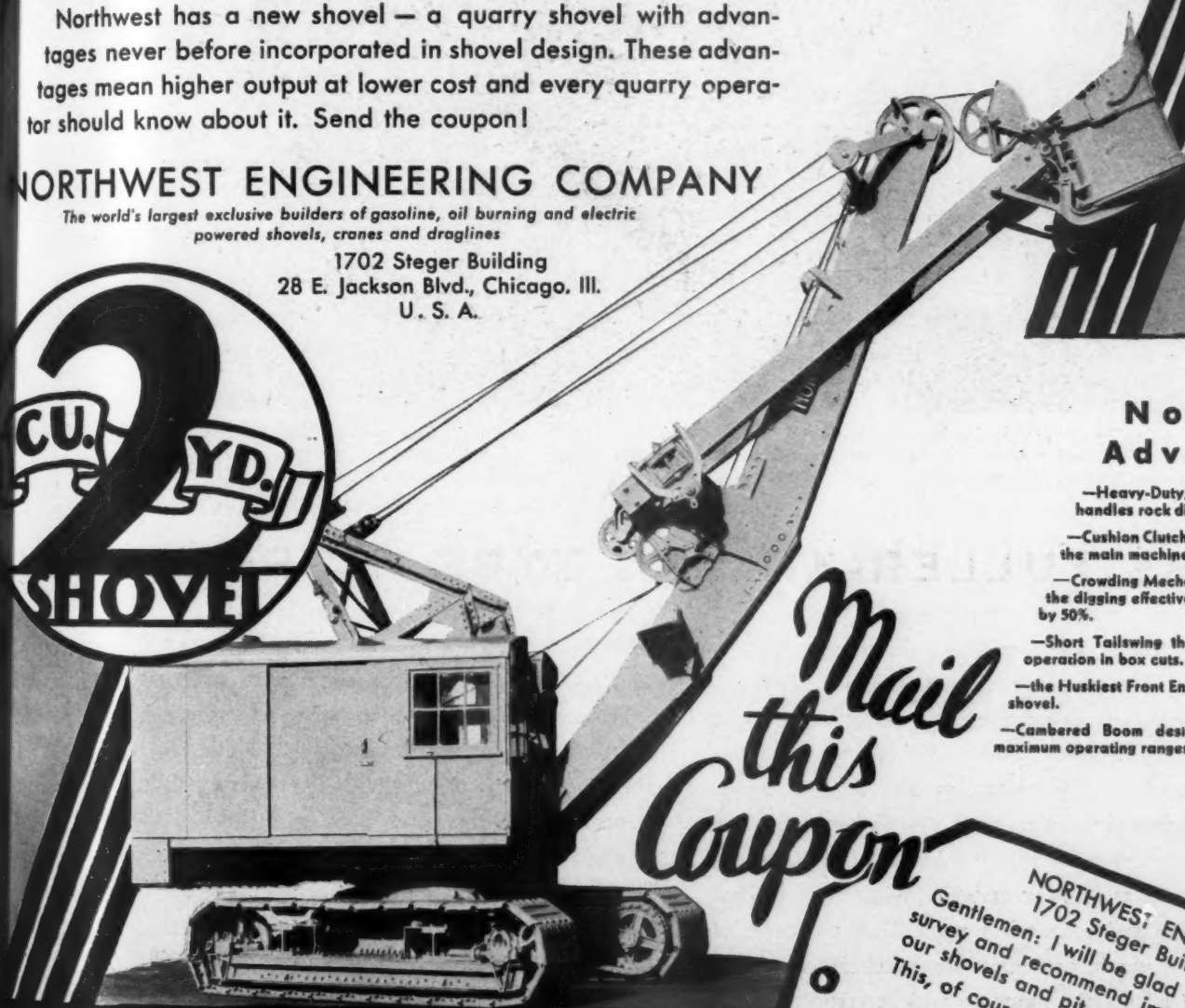
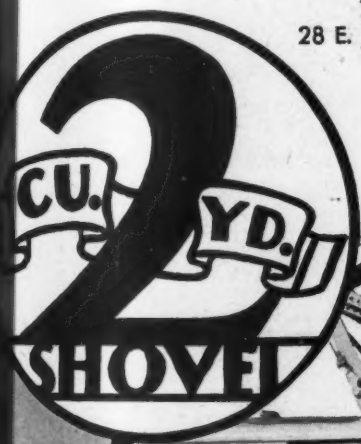
These are but a few of the things that Northwest will check over for you without obligation! We can show you how to save money in the pit!

Northwest has a new shovel—a quarry shovel with advantages never before incorporated in shovel design. These advantages mean higher output at lower cost and every quarry operator should know about it. Send the coupon!

NORTHWEST ENGINEERING COMPANY

The world's largest exclusive builders of gasoline, oil burning and electric powered shovels, cranes and draglines

1702 Steger Building
28 E. Jackson Blvd., Chicago, Ill.
U. S. A.



Northwest Advantages:

- Heavy-Duty, Slow-Speed Engine that handles rock digging with ease.
- Cushion Clutch that reduces strain to the main machinery.
- Crowding Mechanism that increases the digging effectiveness of the engine by 50%.
- Short Tailswing that assures faster operation in box cuts.
- the Huskiest Front End on any 2-Yard shovel.
- Cambered Boom design that gives maximum operating ranges.

*Mail
this
Coupon*

NORTHWEST

will save money

for you in the pit!

NORTHWEST ENGINEERING CO.
1702 Steger Building, Chicago
Gentlemen: I will be glad to accept your offer to
survey and recommend improvements in regard to
our shovels and pit operation.
This, of course, is without obligation on our part.

Name _____

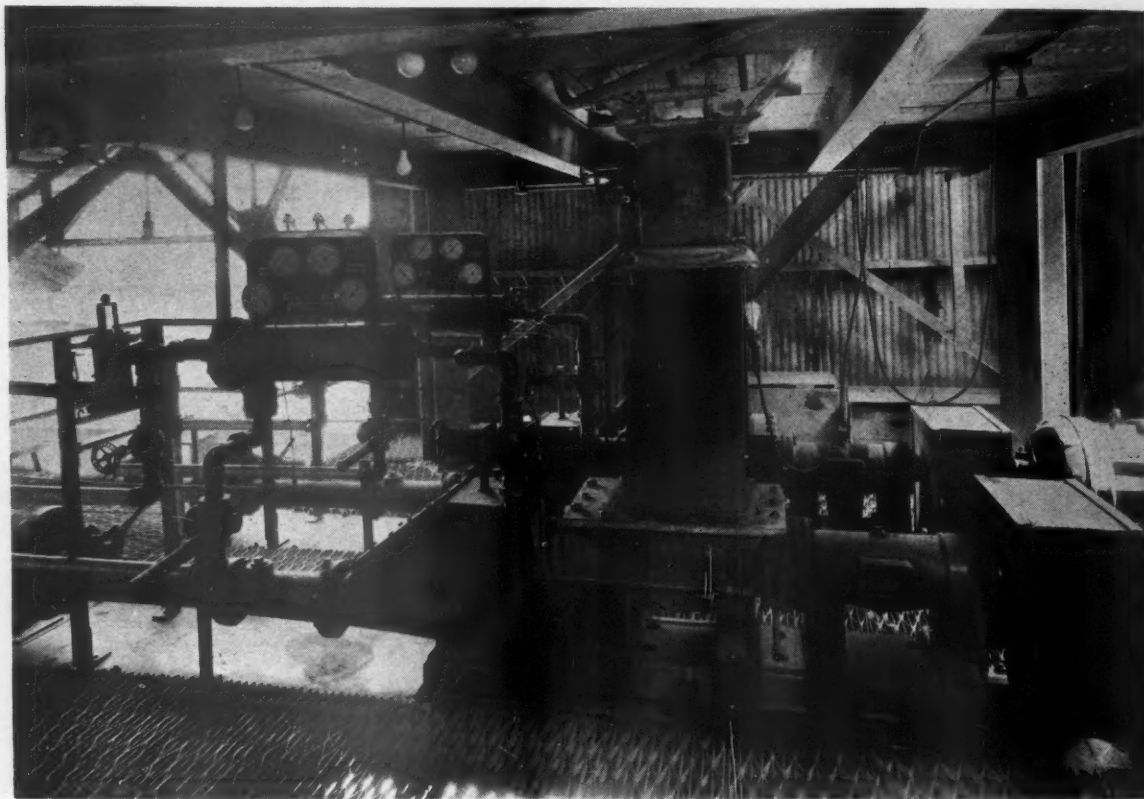
Address _____

Town _____

Company Name _____

State _____

THE NEW LOW PRESSURE — LOW VELOCITY PUMP



Two Type "H" Fuller-Kinyon Pumps (5") conveying dry cement raw materials through independent systems. The Fuller Rotary Feeder, part of which may be seen above the feed spout, is a part of our new weighing feeder.

THE FULLER-KINYON TYPE "H" PUMP

This new pump was specifically designed for stable operation at low pressures. Low pressure, low velocity pumping of dry pulverized materials radically reduces conveying costs. Substantial savings are made in power input to the motor, as well as compressor power. Maintenance costs have always been low, and further reductions have been made as the result of reduced friction and lower material velocities. Operation is stable and economical throughout the capacity range of the pump, providing for excellent operation, which well adapts the pump to wide variations in the rate of feed. This new pump has a number of me-

chanical advantages as compared with previous types that provide for greater convenience. The pump screw may be removed through a port in the valve body at the discharge end, without disturbing the bearings or their permanent alignment. The pump seal may be adjusted while the pump is in operation for the most economical power input corresponding to the rate of feed and the distance of conveying. Automatic lubrication insures a correct amount of oil circulation through the bearings regardless of the level of the oil in the reservoir, which is an integral part of the assembly.

Pulverized Material Feeders and Batchers

Airveyor, — pneumatic conveyors

Compressors and Vacuum Pumps

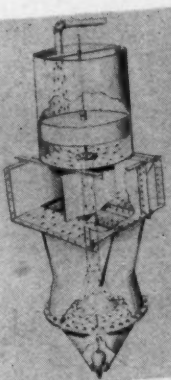
Fuller Company
CATASAUQUA, PENNA. U. S. A.

Chicago: 1118 Marquette Bldg.

Paris: E. Constantin, 105, Rue Lafayette.

Hamburg: Claudius Peters, Walhoff, Glockengiesserwall 2.

How McGrath endorses. LINK-BELT



Sand Classifiers


This Classifier produces the cleanest sand and gives the most accurate sizing of any form of sand separator. It has created for us a new art of "sized values".

PROGRESS In SAND and GRAVEL

McGrath Plants March On!

- ... toward improved service
- ... toward new highs in quality
- ... toward countless new uses for McGrath Products
- ... toward new efficiency in plant design and equipment.

Modern truck units and automatic car scales create accurate weights on truck and carload shipments.



Sand Classifiers make up one of the most important units of a modern sand and gravel washing plant.

Today—Science Dominates

Experienced plant engineers are in charge of the McGrath Modern Plants. Here are the sizes produced:

Washed and Graded Sand—

- Brick and Plastering Sand
- Torpedo Sand
- Engine Sand
- Motor Sand
- Bedding Sand—for stock cars
- Filling Sand

Washed, Crushed and Graded Gravel

- Screened $\frac{1}{4}$ " to 2"
- $\frac{1}{4}$ " to $\frac{1}{2}$ "
- $\frac{1}{2}$ " to 1"
- $\frac{1}{2}$ " to $\frac{3}{4}$ "
- $\frac{1}{4}$ " to $\frac{1}{2}$ "
- Block Gravel— $\frac{1}{4}$ "— $\frac{1}{2}$ "— $\frac{3}{4}$ "
- Roofing Gravel
- Traffic-bound Gravel, all grades
- Bluminous Gravel, all grades
- Concrete Mixture Gravel
- Ballast—to meet specifications

McGrath Building Sand, prepared, cleaned and blended through Link-Belt, Shaw-Sand Classifiers. The color and blending of this sand denotes high quality. It may be matched, but cannot be equalled.

McGrath Washed and Graded— $\frac{1}{4}$ " to 1"—Class 2 Sand (Superior Gravel). Managed by every test known to engineering service and practical usage, this gravel is recognized as a standard coarse aggregate for concrete construction.

The above reproduction is taken from an advertising circular just issued by McGrath Sand & Gravel Company, of Lincoln, Illinois.

Since 1912 Link-Belt has designed, built and equipped 10 complete plants for this company—at Mackinaw, Chilli-cothe, Pekin and Forreston, Illinois.

We are proud of this fine endorsement, and of our long and pleasant relations with such an outstanding producer of high grade sand and gravel.

LINK-BELT COMPANY

5108

CHICAGO
INDIANAPOLIS

PHILADELPHIA
Offices in Principal Cities

SAN FRANCISCO
TORONTO

Equipment for Handling and Preparing
SAND * GRAVEL * STONE * CEMENT
by **LINK-BELT**.



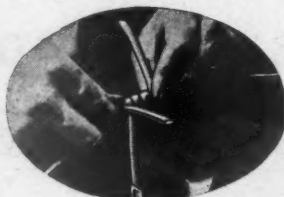
*You can stay in the game
with any three...*

Before you discard, think it over. "Easier loading" with Cordeau means a *saving* in time. "Less hazard" means that you prime and load with an insensitive detonator—and *that's* worth something.

"More work from explosives" means that in a Cordeau-detonated charge, each cartridge has the added force of a primer cartridge. This saving can be considerable. "Easier removal" is the result of better fragmentation — stuff you can dig and don't have to mud cap. And "Giant Blasts" — well, if you can arrange to use one or two big



Use Cordeau in each hole and to connect all holes. Write for the Cordeau book.



shots instead of a lot of little ones, you can plan the job to make some *real* money!

It's your play. Cordeau-Bickford Detonating Fuse is economical — *if you can use it*. You've got three good cards, certain — *and all five will take the pot!*

SAFETY FUSE AND LIGHTERS

Ensign-Bickford Safety Fuse is available in a number of standardized brands, each carefully made for a particular set of conditions. The use of Safety Fuse simplifies blasting technique.

Also—there are a number of Ensign-Bickford lighters, inexpensive — and positive in action.

CORDEAU
DETONATING FUSE
BICKFORD

THE ENSIGN-BICKFORD COMPANY

Simsbury, Connecticut

CB-34



THE MOST CONVINCING PROOF

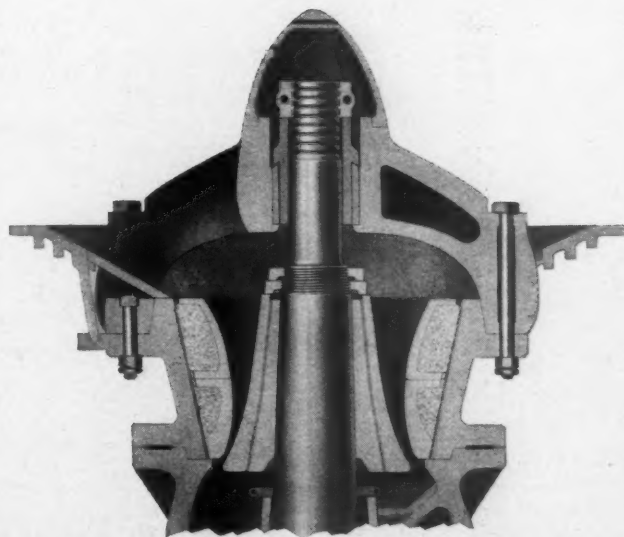
of the value of any article is the wide use of that article. We know that you would profit very greatly by using

TRAYLOR ORIGINAL PATENTED BELL HEADS AND CURVED CONCAVES

either by purchasing one of our Type TZ Reduction Crushers or by installing these parts in one or more of your old gyratories.

WE KNOW THIS

because many of the 200 users throughout the world have told us about their satisfaction with extra profits they have secured.



SATISFY YOURSELF BY EXAMINING OUR BULLETINS 2110 AND 111—YOURS FOR THE ASKING

TRAYLOR ENGINEERING & MANUFACTURING CO. ALLENTOWN, PENNSYLVANIA, U.S.A.

NEW YORK CITY
1513 Empire State Bldg.

CHICAGO
2151 One La Salle St. Bldg.

LOS ANGELES
919 Chester Williams Bldg.

SEATTLE
2410 First Ave. South

Manila Mach. & Supply Co.
Manila and Baguio, P. I.

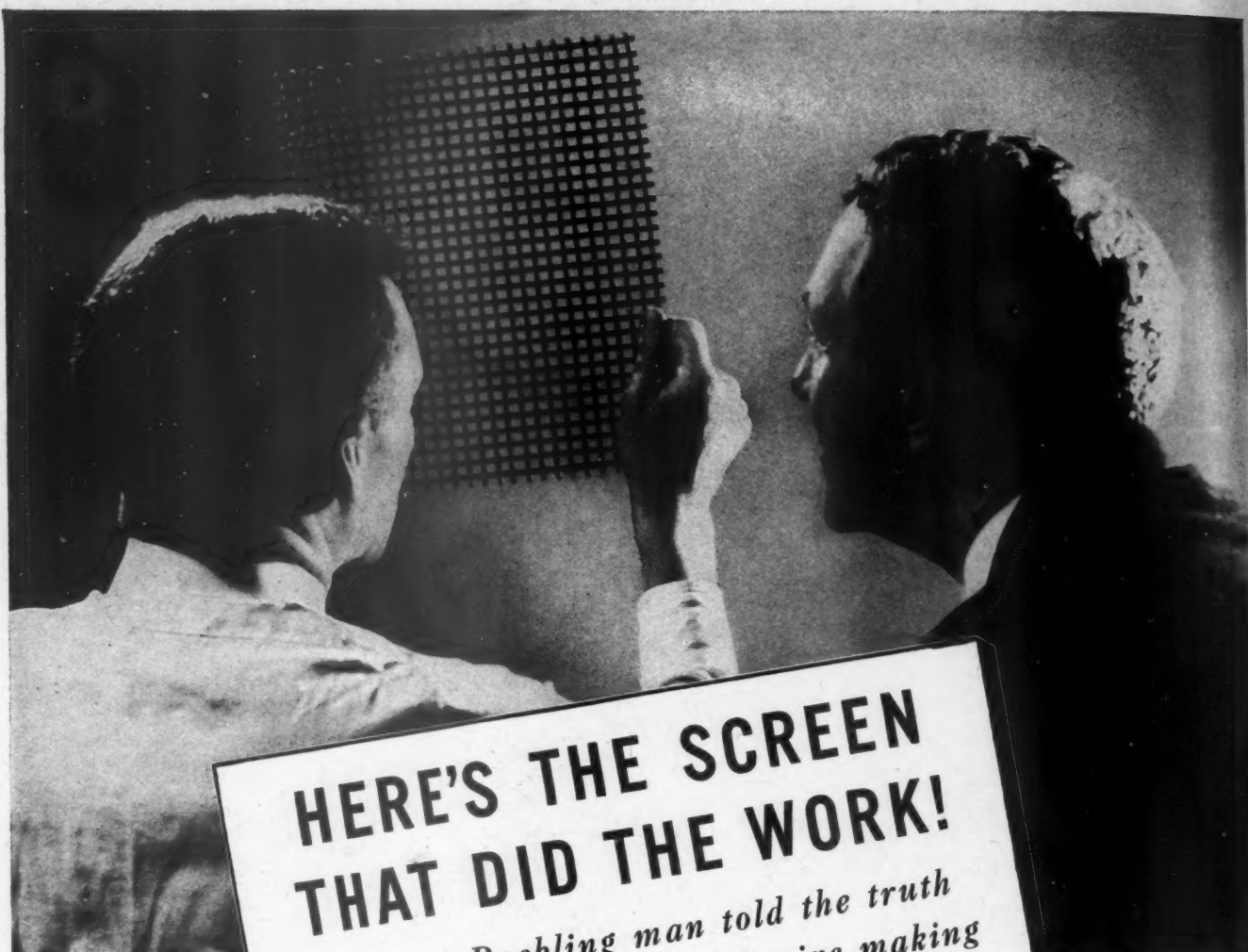
Timmins, Ontario, Canada—Moore Block.

Robins Conveyors (So. Africa) Inc.
Johannesburg, Transvaal, S. A.

Export Department—104 Pearl St., New York City.

Foreign Sales Agencies: London, Lima, Sao Paulo, Rio de Janeiro, Buenos Aires, Santiago, Valparaiso, Antofagasta, Iquique.

European Works—Usines Carels Freres, Ghent, Belgium



**HERE'S THE SCREEN
THAT DID THE WORK!**

*... that Roebling man told the truth
when he said they "know" wire making*

SCREEN USERS benefit from Roebling's thorough understanding of wire and the job that wire must do in the screening operations of the Rock Products industries.

Screen is no better than the wire it is made of. That is the reason Roebling's 90 years of specializing in wire making is important to screen users. Roebling "knows" wire.... knows how to give it the great

strength, toughness and stamina that means low screening costs, just as it means economical wire rope service, or safety for the world's great suspension bridges, or dependable performance in the scores of fields where Roebling wire and wire products are used.

With this unequalled record in wire making, Roebling combines over a half century of knowledge gained

in screen manufacture and from close association with a wide variety of screening problems.

It will pay you to investigate Roebling Wire Screen and its ability to meet severe durability and efficiency requirements. We would welcome your inquiry for information or samples.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, N. J. *Branches in Principal Cities*

ROEBLING *Wire Screen*



ROEBLING - MAKERS OF WOVEN WIRE FABRICS FOR OVER HALF A CENTURY

The Koehring Wheel Dumptor for hauling · dumping · spreading

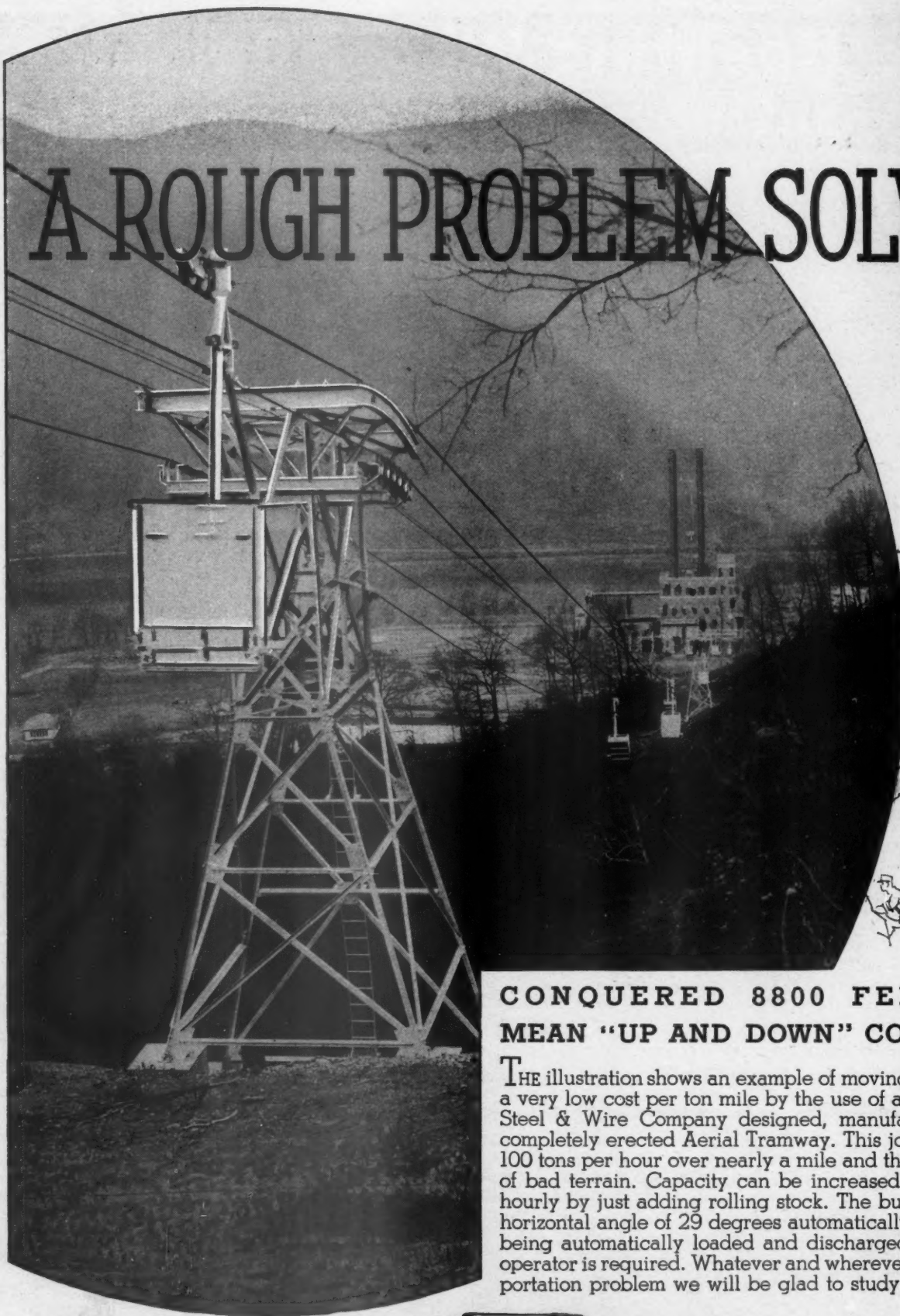
THE Koehring Wheel Dumptor is a dirt-moving unit mounted on pneumatic rubber tired wheels, saving seconds with every move on short haul work. Easily handled and spotted at the loading point — speedy travel — forward or reverse — to the fill — instantaneous gravity dump, with spreading action — a combination of time-saving features for increased production.



KOEHRING Wheel Dumptors operate efficiently and economically with Elevating Graders. Equal speeds, forward and reverse, permit traveling under Elevating Grader with Dumptor Bodies end to end. Continuous loading — no time lost for spotting — production increased. Write for catalog.

KOEHRING COMPANY
MILWAUKEE Division of National Equipment Corporation WISCONSIN

A ROUGH PROBLEM SOLVED



CONQUERED 8800 FEET OF MEAN "UP AND DOWN" COUNTRY

THE illustration shows an example of moving material at a very low cost per ton mile by the use of an American Steel & Wire Company designed, manufactured and completely erected Aerial Tramway. This job is moving 100 tons per hour over nearly a mile and three-quarters of bad terrain. Capacity can be increased to 175 tons hourly by just adding rolling stock. The buckets turn a horizontal angle of 29 degrees automatically, as well as being automatically loaded and discharged. Only one operator is required. Whatever and wherever your transportation problem we will be glad to study it with you.

1831



1934

AMERICAN STEEL & WIRE COMPANY

208 South La Salle Street, Chicago
94 Grove Street, Worcester

SUBSIDIARY OF UNITED STATES STEEL CORPORATION
AND ALL PRINCIPAL CITIES

Empire State Building, New York
First National Bank Building, Baltimore

Pacific Coast Distributors: Columbia Steel Company, Russ Bldg., San Francisco

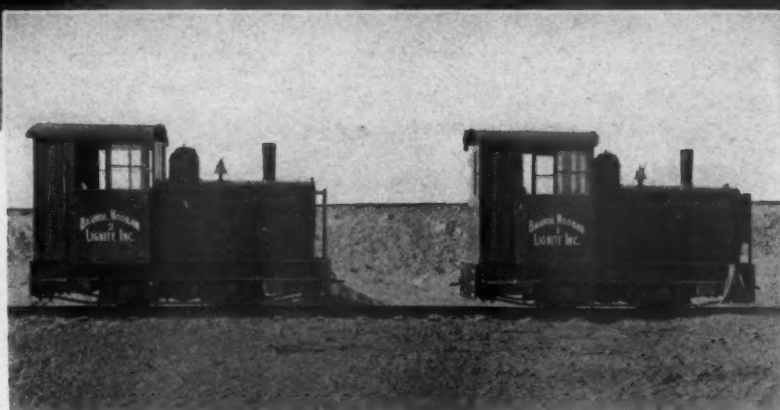
Export Distributors: United States Steel Products Company, New York

ROUGH TRACK · · HEAVY LOADS · · · MILE HAULS



**BAUKOL
NOONAN**

use



TWO PLYMOUTH LOCOMOTIVES

Two years ago, Baukol Noonan Lignite Inc., of Noonan, North Dakota, purchased two Plymouth 16 Ton Gasoline Locomotives for their modern plant in Divide County, N. D. Today, after two years of strenuous service, these Plymouth Locomotives are performing "very economically" and "very satisfactorily."

Baukol-Noonan's average haul is one mile over rough track, sharp curves and short grades. Each locomotive handles ten five-ton cars with a gross weight of 160,000 lbs.

Plymouth Locomotives have stood the tests of time and service and giving years of economical, trouble-free service to hundreds of users. Send for Bulletin.

PLYMOUTH » GASOLINE » » DIESEL »
GAS ELECTRIC DIESEL ELECTRIC
LOCOMOTIVES

PLYMOUTH LOCOMOTIVE WORKS, PLYMOUTH, OHIO, U. S. A.



Removability

**makes
them both**

Economical

Modern pencils have done away with the waste of whittling. Modern Timken Rock Bits eliminate the waste of reforing.

Don't reforge—remove. It is quicker, cheaper and more efficient. The driller renews the bits right on the job as he needs them. Transporting a lot of heavy, awkward steels back and forth is a thing of the past.

It isn't necessary to keep so many steels on hand either. Steel investment is correspondingly reduced.

Furthermore, Timken Bits are correctly designed to drill fast and accurately. They are made of Timken fine grained electric furnace steel for longer life—more footage per bit.

You'll never know the savings you are passing up until you try Timken Bits. Write for full information.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN BITS

"ED" AND "RED" TALK OVER THE NEW MARION LINE

**"I'LL TAKE MY HAT OFF
TO MARION CRAWLERS
EVERYTIME" « « « «**

... you will never find these crawlers binding or clogging—regardless of the material—and no matter how tough traveling conditions are."

"They shouldn't, Red . . . not with a roller practically over each shoe . . . the way the sprockets and shoes are built to shed dirt . . . and look at the width of those shoes."

The crawlers on the complete line of MARION CLUTCH TYPE EXCAVATORS are of the most dependable construction. Sprockets and shoes are especially designed to eliminate clogging—ten double faced rollers prevent crawlers from binding when moving over uneven surfaces or obstructions—the extra wide manganese steel crawler shoes reduce bending and breakage to a minimum.

WRITE FOR BULLETIN DESCRIBING THESE EXCAVATORS IN DETAIL

**THE
MARION**

**STEAM SHOVEL CO.
Marion, Ohio, U.S.A.**

ELECTRIC • GASOLINE • DIESEL • STEAM • GAS-ELECTRIC • DIESEL-ELECTRIC • SHOVEL

CLAMSHELL • DRAGLINE • TRENCH SHOVEL



ROBINS SCREENS ARE INTERNATIONAL

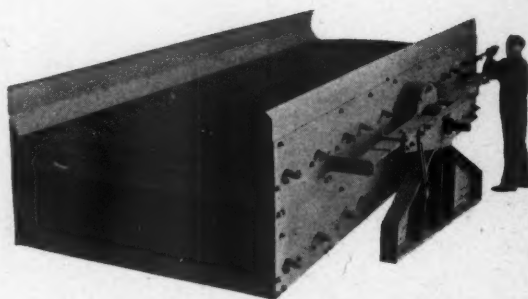
RECENT ORDERS HAVE INCLUDED—

Six GYREX SCREENS for sizing
Gold Ore in South Africa.

Eleven GYREX SCREENS for sizing
Coal in South Africa.

Four GYREX SCREENS for scalping
Iron Ore in Morocco.

Two VIBREX SCREENS for separ-
ating Bagasse in Hawaii.



A Double Deck ROBINS GYREX
SCREEN six feet wide by sixteen
feet long to handle 250 tons per
hour of Iron Ore.

These foreign purchases are in addition to scores of orders
from all parts of the United States for screens to handle
Stone, Sand and Gravel, Slag, Ore, Coke, Coal, etc., etc.

The Reason Is Simple—ROBINS SCREENS ARE DEPENDABLE

They do the work they are built to do—smoothly, quietly, continuously. The
GYREX SCREEN is described in a new bulletin—Ask for your copy. ROBINS
also builds dependable Belt Conveyors and a host of other material-handling units,
as well as Complete Plants.

Forty years' engineering experience at your service

ROBINS CONVEYING BELT COMPANY

15 Park Row, New York

Old Colony Bldg., Chicago

Boston
Charleston, W. Va.
Cleveland
Detroit

MATERIAL HANDLING
ROBINS
EQUIPMENT

Philadelphia
Pittsburgh
London
Johannesburg

Representatives in other principal cities

Flash DRYING SYSTEM

with the Raymond KILN MILL



THIS faster method of drying *while pulverizing* offers some important new advantages:

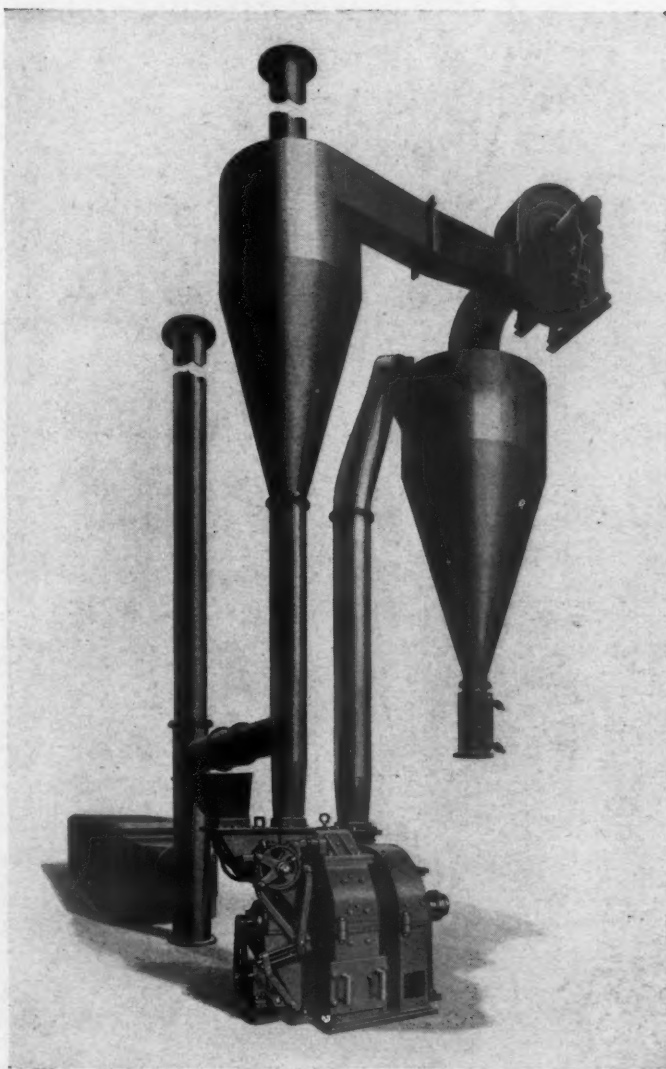
- Widens the range of use of the Kiln Mill
- Removes higher percentages of moisture
- Permits closer control over the product
- Gives increased economy of manufacture

Materials with a moisture content up to 65% can be rapidly dried and ground to a powder of specified dryness and fineness in *one* operation. No separate dryers are necessary. This impact type mill reduces the material to an extremely fine, uniform product. As the material is broken down to powder, hot air is passed through the system, absorbing the moisture and venting it with the excess air.

As a comparison: In dehydrating a mud-like substance by ordinary methods, the time of passage through a dryer averages 40 minutes, while only *ten seconds* is required by the Kiln Mill to reduce the material to a bone-dry powder.

The Raymond Flash Drying System is showing remarkable results in pulverizing marl and reducing the moisture from 30% down to one per cent—grinding soft limestone for agricultural fertilizer and reducing moisture from 20% to less than 5%—dehydrating and disintegrating a washed clay by high temperature drying.

If you can use the Kiln Mill on your product, it means vastly lower costs—for installation, operation and production. Tell us your requirements.



Hammer-type Kiln Mill equipped with the Flash Drying System. For complete details, write for the Raymond Bulletin of Kiln Mills.

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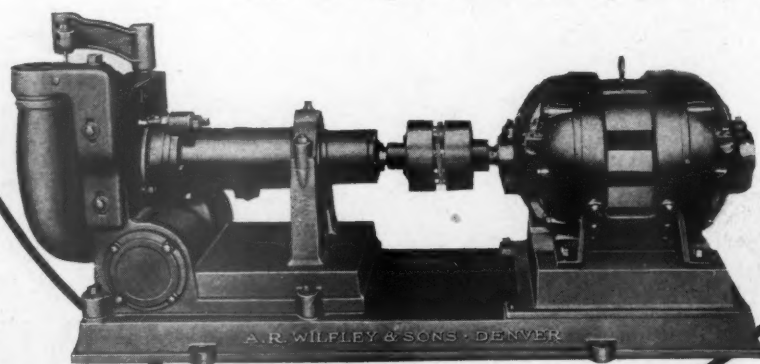
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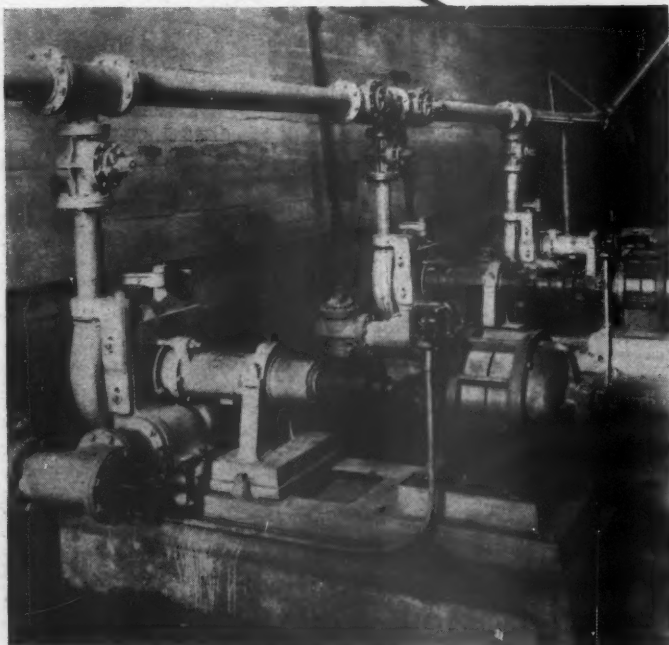
... they are going to handle the slurry in a new cement plant now being built — the only new plant in two years or so.



Sizes 1" to 8"
Belt or Direct Drive



Reg. U. S. Pat. Off.



Hazarding a guess, we would say that the principal reason why this company selected Wilfleys for handling the slurry was because their performance record in the sixty-odd other wet process plants is such a consistently good one.

Wilfleys are dependable. Their non-stuffing box design makes them low-cost pumps. Their simple clearance take-up makes them high-efficiency pumps. And their 10-minute change of pumping parts makes them time-saving pumps when parts are changed.

It would pay you to use Wilfleys for handling slurry in your mill.

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IT'S performance on the tough jobs that tells the real story. There's where P&H stamina shows up. It's the faster digging cycle . . . the shock absorbing construction . . . the extra measure of power that makes P&H operators star operators for bigger yardage. These P&H shovels with Split Second Control are built to "take it" — that's why operators call 'em "bears for punishment".



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the 50th year



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Williamsport Wire Rope



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On large shovels particularly, Williamsport "Purple Strand" has established a splendid record for endurance and long service.

You may have a job requiring severe wire rope service. We suggest you try "Purple Strand"—better still, write our engineering department and get their suggestions without obligations. We have been of great help to others, maybe we can be of similar help to you.

And by the way "Form Set" preformed wire rope made in our plant is the latest idea of preformed Wire Rope.

Write today for further facts.

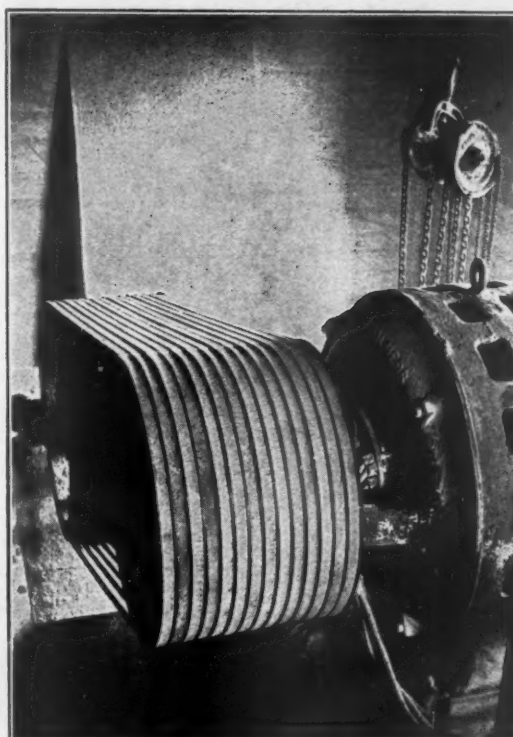
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MEDART ROPE **V** DRIVE PATENT 1,662,511

This Medart V-Rope Drive was installed two years ago by the Columbia Quarry Company, Columbia, Illinois, to operate a 48" Gyratory Crusher, producing 250-300 tons per hour and handling stone varying in size up to 4 tons...The savings, performance and efficiency — as tabulated on this page — were so outstanding that four additional Medart V-Rope Drives were installed in the same plant.



This quarry job is a typical example of what Medart Power Transmission Equipment and Medart Engineering are doing in the Industrial Field—either by replacing costly methods or supplying new equipment where low-cost transmission is a factor.

Data	Old Set Up	New Medart Set Up
MOTOR	200 h. p. Slip Ring — fused to carry peak load of 500 h. p.	Same
DRIVE	Horizontal—26", 6-ply, flat belt	Horizontal—14, 1½"x1" Medart V-Belts
PULLEY CENTERS	19' 7"	6' 8-5/16"
MAINTENANCE	Replaced belt each season... Belt tension adjustment necessary 2 or 3 times weekly. Tension was so great that motor feet were broken off... Replaced crusher bearing twice each season.	No belt replacements in two seasons. No belt tension adjustments. No bearing replacements.
SAVINGS	None	No shut-downs. Lower power cost. Lower demand charge. Greater motor efficiency. Less space, due to short-center drive.

IN EVERY INDUSTRY—Medart is applying the same effective economy regardless of the type, size or requirements of the application... Medart means Everything in Power Transmission and Special Equipment—PLUS IMMEDIATE SERVICE.

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EVERYTHING IN POWER TRANSMISSION & SPECIAL EQUIPMENT

CAN THE BELTS Stand Punishment like this?



WHILE we don't recommend abusing belts, we build belts that can stand abuse when operating conditions make it necessary. Here are illustrated four out of thousands of proofs that Goodrich Belts last longer, stand punishment better:

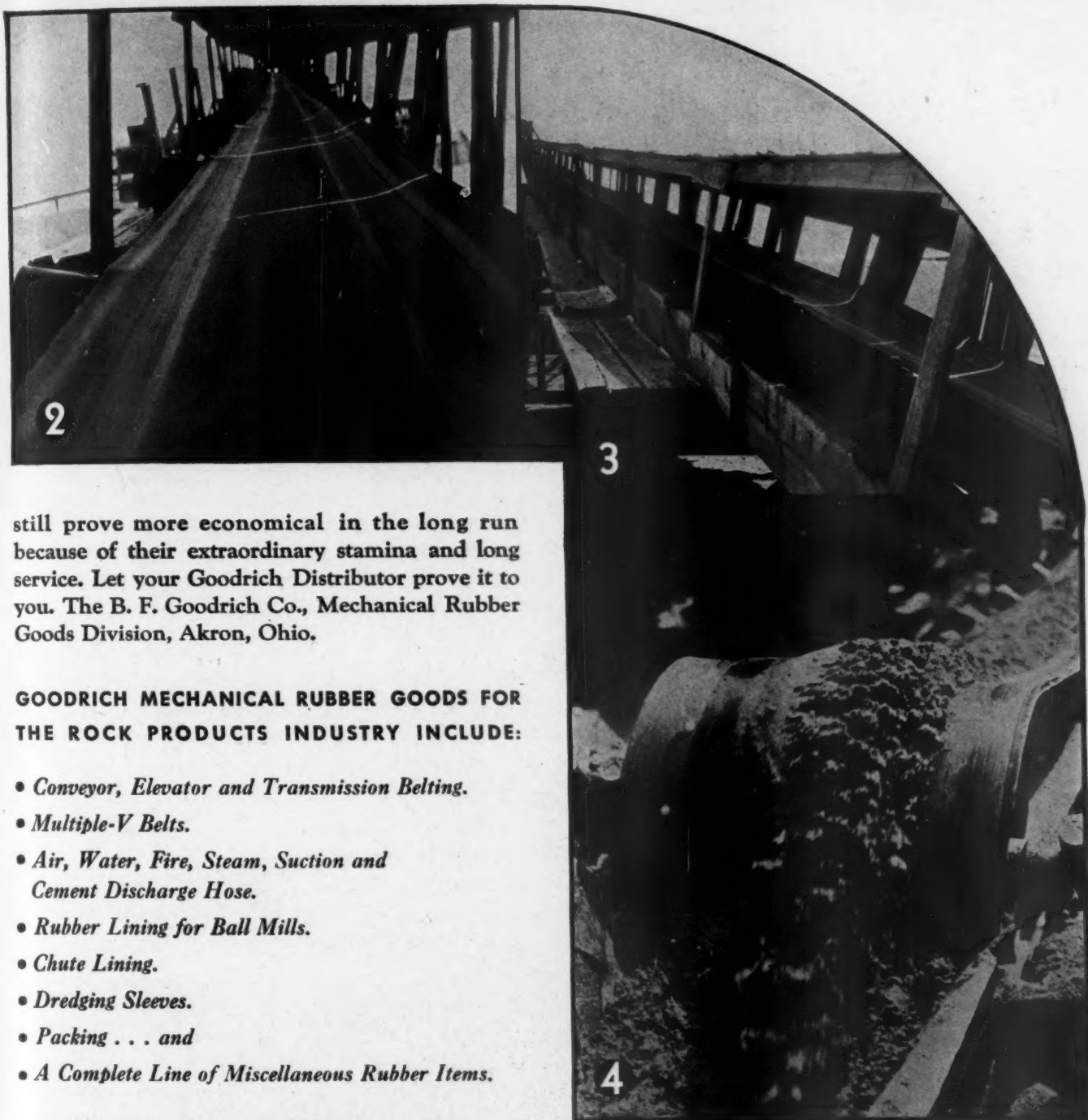
- ①** One edge of the belt clear out over the idlers due to faulty loading conditions. Most belts would be cut to pieces, but this one has been carrying 650 tons of ore a day for 10 years! Goodrich Conveyor Belt.
- ②** Misalignment. Guide idlers necessary. Edge wear quite noticeable. Weaving back and forth like this, any ordinary belt would fray and the plies would separate in short order. But this one has been carrying heavy loads of rock for 8 years! Goodrich Conveyor Belt.
- ③** No decking between strands of belt. Gravel falls on the returning belt and is ground between pulleys and the back of the belt. Enough to wreck almost any material, but this belt has stood it for more than 7 years! Goodrich Conveyor Belt.
- ④** Sand Conveyor Belt. Subject to sunlight and alternately damp and dry, hot and cold weather. In addition, due to misalignment one edge has been worn through by continual rubbing on frame. But this belt "can take it," and has done so for years. It's Goodrich Conveyor Belt.

What's the answer? Experience and care. Goodrich experience with thousands of belt histories, and Goodrich care in focusing this experience on every belt installation. You know the conditions of your job; we know belts. Together we can arrive at the belt which will give you the lowest possible cost per ton handling.

Goodrich Belts cost little if any more than other brands. But even if they did cost a great deal more, they would

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still prove more economical in the long run because of their extraordinary stamina and long service. Let your Goodrich Distributor prove it to you. The B. F. Goodrich Co., Mechanical Rubber Goods Division, Akron, Ohio.

GOODRICH MECHANICAL RUBBER GOODS FOR THE ROCK PRODUCTS INDUSTRY INCLUDE:

- Conveyor, Elevator and Transmission Belting.
- Multiple-V Belts.
- Air, Water, Fire, Steam, Suction and Cement Discharge Hose.
- Rubber Lining for Ball Mills.
- Chute Lining.
- Dredging Sleeves.
- Packing . . . and
- A Complete Line of Miscellaneous Rubber Items.

ALL *products problems* IN RUBBER

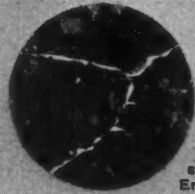


Conveyor Belting

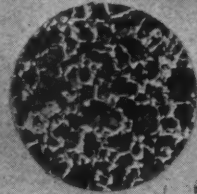
Profit through modern Bucyrus-Erie dependability

Increasing business emphasizes the need to modernize for profits. Excavators of 10 years ago are, today, as unreliable and inefficient as a 1924 automobile. Modern dependability insures the steady reliable service that means increased output and lower costs. The outstanding dependability of Bucyrus-Eries is a result of many individual features. Take steel as an example. Special alloys developed to meet the grueling needs of excavator service are mixed, melted and poured in our own foundries, checked and controlled by experts in our own laboratories, annealed in our own foundry ovens, heat-treated to exactly the right temper in our own modern heat-treating plant. All these factors of specialized production and direct control add to Bucyrus-Erie dependability. Ask for detailed information on the balanced value of the Bucyrus-Erie that fits your needs.

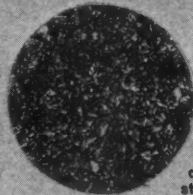
BUCYRUS-ERIE COMPANY
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Micrograph made in the Bucyrus-Erie metallurgical laboratory showing BE-YZ steel as cast in the Bucyrus-Erie foundry.



Normalizing the steel in one of the annealing furnaces is the first step in the tempering process. Here is a micrograph of YZ normalized.



In the heat-treating plant internal stresses are further relieved and greater strength developed, so that this micrograph of YZ after quenching shows an entirely different grain structure.

See **BUCYRUS ERIE** before you buy!

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Quite often chains are treated in that humor. Nobody thinks about them until all else is attended to . . . then it is, "Oh Yes—Chains".

Yet Chains are a vital part of almost every material handling problem in any industry. They transmit power . . . are the fundamental basis of many types of conveyor . . . act as conveyors in their own right.

Jeffrey Chains have served Industry for over a half century. In fact, Jeffrey conceived and developed the Steel Thimble Roller Chains, Hercules, Flat and Round Link and many other popular types. Chains were our earliest product . . . we know how to make them exceptionally well.

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CEMENT and ENGINEERING NEWS

Founded
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Volume XXXVII

Chicago, September, 1934

Number 9

Recovery Progress—Trends

AUGUST was a relatively quiet month in Washington. There do not appear to have been any radical new developments. The NRA elaborated on its interpretation of the President's invitation to industry to cut prices to governmental agencies not to exceed 15% of regularly posted prices, and these explanations take some of the sting out of the original executive order. There is belief in some quarters that the President may overrule the NRA on these qualifications of his evident intentions, but the latest is that there will be little change for the time being.

Apparently few producers have availed themselves of the chance to cut their previously posted prices, and at least one group of industries, the crushed stone, sand and gravel and slag industries, has officially requested NRA to be exempted from the application of this executive order. The Inland Steel Co., Chicago, has reaffirmed its price list for the fourth quarter, and it is assumed that its action is typical of that of the steel industry as a whole. The great desire of all structural material manufacturers seems to be stability at or about present price levels.

Future of NRA

With less than a year of life ahead for NRA, industry is beginning to speculate seriously on the future of NRA as now established. It is generally accepted that NRA will be governed by a board headed by Gen. Hugh S. Johnson and that it will eventually become more advisory than regulatory. There seems to be a sincere desire to let industry solve its own problems and run its own affairs, subject only to restrictions which will amply protect labor and the public. Consequently responsible trade associations seem destined to occupy a far more important part in the picture than heretofore.

The need of cooperative promotional work by trade associations is fully appreciated, at least in connection with the work of the Federal Housing Administration, and probably we shall see such activities encouraged under NRA, for it certainly would help

restore confidence. Thus far the only commitment of NRA policy toward purely association activities that we have seen is a letter from the legal division to the Federation of Wooden Package Associations which says that NRA is interested in association dues to the extent of seeing that they are fair and equitable and that no restrictions are placed upon membership which would prevent those who wanted to from joining—in other words to remove obstacles to such association membership. This should prove of distinct advantage to legitimate trade associations as it implies NRA assurance that they will be run for the benefit of all members.

New Enforcement Plan

The part of all codes that is causing the most trouble at present and is an obstacle to turning their administration over to trade associations, is compliance and enforcement. Many trade associations had fair practice rules and regulations and open price plans before the advent of NRA, but were powerless to enforce them. Most of the complaints from industry under the NRA codes are that code provisions covering these activities are not or can not be enforced against a non-coöperative minority. It is said a new plan for code compliance is under consideration which includes a special scale of penalties in addition to those provided in the recovery law, and the suggestion for voluntary application to all code authorities. The new plan is officially explained as designed to aid code authorities in bringing violators into line without resort to the courts. Agreement to the mutual penalty plan would be on a separate basis from assent to code provisions. It would be binding only on those units in an industry which agree. Under the new proposal, damages would be paid workers in the case of code labor clause violations entailing underpayment to employees. Penalties for other types of violations would be used in code administration, or distributed to those non-violating members of the industry agreeing to the plan. The plan calls for an agreement among members of any given industry to pay damages for code violations. Jurisdiction for determining vio-

lations and effectuating a scale of penalties is provided under an impartial agency. This could either be set up by the industry or handled by NRA if industry desired. Industry would still be faced with the problem of those who would not sign up; but since compliance depends in the last analysis on public opinion, it would seem that public opinion could be used as well to get signatures as to compel enforcement of the provisions in criminal actions.

One of the most capable of the former division administrators of NRA is A. D. Whiteside, president of Dun and Bradstreet; at a recent meeting of the National Merchants' Association Mr. Whiteside urged support of NRA until business itself is able to formulate a substitute. He listed three alternatives: outright repeal of NRA, continuance of the act without modification, or the repeal of the act and replacing of it by important amendments to the Sherman anti-trust laws and the Clayton act.

Proposed Freight Rate Increases

Faced with increasing costs of all materials and supplies and saddled with imminent outlays for employees' pensions the railways have formulated plans for a general freight rate increase, which will fall heaviest on what they term "bulk freight classifications which cannot readily find substitute transportation." This includes all rock products and at the present time would be a most unhappy development, especially to the aggregate industries, which are having a hard struggle to compete with material produced on the job by municipal and county governments and by highway contractors.

Prospect of Higher Taxes

More unwelcome news is that the new Congress will seek new ways to wring more revenue from producers through income taxes. According to the *Wall Street Journal*, "the most immediate aspect of the intensive drive for added funds is the far-flung effort to make existing tax laws yield as they never have before. There is a firm conviction in some Treasury quarters that perhaps as much as \$200,000,000 in untapped revenue is merely awaiting proper enforce-

ment and collection methods to begin its flow into the Government coffers. Of this amount of prospective new revenue, some \$80,000,000 to \$90,000,000 is expected to come from a close-fisted administration of new depreciation regulations, promulgated a few months ago and now in process of enforcement. While the Treasury is determined to continue to permit proper deductions for depreciation, yet it is felt that in the past much-needed revenue escaped through the depreciation loophole."

Vast Amount of Idle Credit

Although New Deal opposition newspapers use these facts to discredit it, the accumulation of nearly two billions of dollars of credit in the Federal Reserve member banks may prove a great boon to industry, with a return to a more optimistic viewpoint. With a change in business sentiment there is obviously enough surplus, or at present unused credit, to make business go like a house afire. Moreover, the combined holdings of U. S. Government securities of 400 banks in 91 cities on August 8 amounted to over nine billions, or one-third of the entire Government debt. All of these nine billions could readily be converted into currency or usable credit should demand arise for it. We all know things are going to start some time, and it takes only a few leaders with courage and confidence to change the business picture very rapidly. Probably we shall be faced before long with as big a problem to hold the lid on as we are now to get it raised.

Increase in Farm Income

In spite of and because of the drought conditions in many localities, farmers as a whole will have a total cash income for the year which began June 1 substantially more than the previous 12 months, according to the American Institute of Food Distribution. About 80% of all American farmers will have more income because of the drought, and the reduction of live stock will have a long-time effect on food prices which are now 17% more than a year ago.

Lower Sales Prices Ultimate Goal

For once the two leading figures in the automobile industry seem to be in agreement on national policy. Henry Ford in his Century of Progress epigrams says: "Overproduction is a money cry, not a human cry; produce ever more." Alfred P. Sloan, Jr., president of General Motors, says in his semi-annual report: "The objective should be not merely a more favorable relationship of cost to selling prices, but what is of more vital importance, real selling prices themselves must be reduced—they must be brought within the range of a greater number of buyers. In no other way can industry be stimulated to higher levels of activity—in no other way can the unemployment question be intelligently attacked—at least that is the thinking of General Motors and its approach to the problem."

Producers of staple commodities, or of capital goods, probably do not see the application of this policy so readily; but it holds nevertheless in the long run. When construction materials can be sold profitably at lower prices more of them will be used, because new structures will replace old ones faster—cost or price is as important a factor in the replacement of buildings and structures as it is in the replacement of automobiles.

Housing Shortage

A lack of sufficient housing facilities to properly accommodate the population is revealed in preliminary announcements of the Department of Commerce's real property inventory. The report, interpreted by Acting Secretary Dickinson as demonstrating a real need for new construction, showed that vacancies average 7.7% of total housing throughout the country, while 16% of all units studied were found to be overcrowded. The survey covered 63 cities throughout the country. Results were announced on tabulation of 59 returns, reports from Minneapolis, St. Paul, Atlanta, Wilmington and Providence not yet completed. The survey was confined to medium large cities; Chicago and New York were not studied. Of the homes studied, 16% were found in need of structural repair, 44% were in need of maintenance repair and 2.34% were unfit for habitation.

It was found that construction of dwelling units during the last five years has dropped to one-half of the preceding five years, Dr. Dickinson stated. Single family dwellings are still generally favored, explaining that of new buildings erected in the last 10 years, occupants living in single dwelling homes amount to 88% of the total.

A special problem in the case of vacancies is that of such cities as Philadelphia, where families have moved from downtown areas to the suburbs, the Commerce Secretary stated. The resulting empty houses cannot be classified as real vacancies as they probably will never again be utilized, he added. Such buildings are being torn down in increasing number and replaced with parking lots, Mr. Dickinson stated.

The Commerce Department survey did not include a study of vacancies of this type.

Real Estate Values Rising

A more active market for real estate in 70% of the cities of the United States, with a recent rapid absorption of space, particularly in single-family residences, is shown in the 23rd semi-annual survey of the real estate market, covering 268 cities, by the National Association of Real Estate Boards. This increasing absorption of space is already reflected in rising residential rents, shown for single-family dwellings by 49% of the cities reporting.

Shortage of single-family residences is shown by 49% of the cities reporting. Normal balance between supply and demand for

this type of structure is shown by 47% of the cities, and oversupply by only 4% of the cities. No city of over 200,000 population reports a present oversupply of single family dwellings. The like survey of one year ago showed shortage of such dwellings in only 12% of the cities and oversupply in 16%.

Prices have not advanced as generally as has turnover, but selling prices are already higher in 33% of the 268 surveyed cities. They are unchanged in 52% of the cities, lower than a year ago in 15% of the cities.

Cities of over 500,000 population show most general gain in market interest, 80% of them reporting a more active condition than prevailed a year ago, 20% an unchanged condition, but no city reporting a weaker market. However, these largest cities lag behind the country as a whole as to price rise.

Business space shows more gain than office space as measured by rent appreciation. Central business districts, for both types of structure, lead outlying sections in this change. Higher rents are reported in central business property in 20% of cities, stable rents in 64%, lower rents in 16%. For office buildings only 9% of the cities report higher rents, but on the other hand only 13% report lower rents, 78% reporting a stabilized rent level.

Large Volume of Highway Work Under Way

Progress made on emergency construction of public works highways to August 11 under the supervision of the U. S. Bureau of Public Roads shows a total of 8,316 projects, estimated to cost \$407,296,000, had been advertised for contract, begun by day labor employed directly by the highway authorities, or completed. The cost of the day labor projects included in the above is estimated at \$30,765,000. Of the 8,046 projects awarded for construction, 4095 were under construction on August 4 and 3656 were completed. The work under construction, which is estimated to cost \$253,380,000, was giving regular employment to 274,900 men. In the whole country, work under way and completed involved 95% of the \$400,000,000 provided for public works highways under Section 204 of the National Industrial Recovery Act.

Court Decision Speeds Slum Clearance Plans

The administration proposes to proceed speedily with its nation-wide program of slum clearance now that the Government's right to acquire land for this purpose and for low-cost housing was upheld by a recent decision of the United States District Court of Ohio at Cleveland. The housing project is one of the divisions of the Public Works Administration which has allotted it \$125,000,000 to engage in its program under Col. Horatio B. Hackett. The Cleveland project is one of more than 30 housing projects under consideration. The division is

nearly ready to start demolition on the university project in Atlanta.

Secretary of the Interior Ickes declared recently that "the Government has no intention to abandon or sidetrack its low cost housing and slum clearance activities."

Reports that the housing division has been virtually abolished were emphatically denied. He said: "The acquisition of land at a fair price to the government is a slow and tedious process through which we are passing. Obviously we cannot disclose these sites until the government takes title."

FHA Administrator Defends Present Price Levels

James A. Moffett, Federal Housing Administrator, in a country-wide broadcast, August 14, defended current price levels in the building industry, of which a survey had been conducted before the FHA program was launched. "Surely," he said, "if industry generally is operating with little, if any, profit, it is not in a position to make a radical reduction in prices. I see no reason why repairs, improvements and modernization, and the building of new houses should be done without a fair profit to industry. Our position is simply that fair prices must be fair to both the producers and the consumer. We find that all of the leading items entering into building costs are below the 1926 price level. Consequently investments for repairs or new construction at the present price level constitute a proper basis for investment on the part of the American people."

Separate Code for Home-Builder Contractors

The National Association of Real Estate Boards, in convention at Chicago, Ill., asked that home building be given a code separate from the present general construction code, thus permitting it to take advantage of its own inherent conditions favorable for immediate advance under the new national housing act. "We are enthusiastically behind the government housing program, but we believe it can be successful only if costs are permitted to find their own level in accordance with conditions in each community," the association states. Early action has been assured on the separate code for home building filed by the association and now on General Johnson's desk. Pending decision on the separate code, home building has been temporarily exempted from the general construction code except for hour and wage provisions.

How to Get Government Money for Home Modernization

While it is hoped producers of rock products have no need to apply for loans to modernize their own homes, each and every one should be able to tell others how to do so, for this will probably prove to be the most effective method of developing this market. The manner in which the borrowers may obtain loans is simplicity itself.

Suppose, for example, John Smith wants

to have his house repainted, or have necessary repairs made. He does one of three things:

1. He goes directly to an approved bank, fills out a credit statement, and signs a promissory note when the credit is approved. He is given the proceeds of his note. Then he can engage his own contractor, buy his own materials and have the work done any way he desires—provided, of course, that he satisfies the lending institution he is not squandering the money.

2. Goes through the same procedure with an industrial bank, in which event a discount note probably would be used which would be paid off in monthly deposits.

3. Engages a contractor or dealer to do the desired work, and submits a credit statement to him. The latter has the statement approved by a bank, then proceeds with the work. When completed, Smith gives the contractor a promissory note. The contractor then endorses the note, and sells it to the bank for cash.

Public Works Employment Planned

It is being freely predicted that the coming winter will see as much or more need to provide emergency employment as last winter. The CWA, as such, no longer exists, but it is said plans for a similar organization to provide employment on public works and maintenance will be developed. Last winter the CWA gave employment to 4,000,000; and their work required the purchase of considerable construction material, although most of the money went for payrolls.

Labor Developments

Strikes in all kinds of industries, mostly to compel closed shop, application seniority rules, etc., are widespread. Even the U. S. Government is affected since Federal Emergency Relief workers in Milwaukee, Wis., are on strike at this writing. National Recovery Administrator Johnson and Secretary of Labor Perkins are reported to have quarreled over the causes of labor unrest. Gen. Johnson is said to blame Section 7A of NIRA, while Miss Perkins says: "Section 7A is a new statute not completely understood by labor or employers. We have resistance on the part of employers sometimes based on ignorance, sometimes on a misunderstanding and sometimes on deliberate misinterpretation. When 7A is fully understood, we shall avoid a great many strikes."

So far strikes in rock products plants have not been widespread; those which have been going on in some Ohio quarries since last May have recently been settled.

The NRA and the newly created National Labor Relations Board are at outs over the board's ruling that the NRA administrator must swallow his pride and prejudice and take back an employee he fired because of insubordination. The employee was the head of the NRA employees' union and the general did not like his presumption in one or two instances.

Perhaps as a result of this little controversy, the *Chicago Tribune* reports the NRA does not regard itself as obliged to withdraw the Blue Eagle in cases where the National Labor Relations Board has found companies guilty of violation of section 7A of the NIRA and of subsequent failure to obey the instructions of the board. The labor board has recommended withdrawal of the Blue Eagle to the NRA compliance board in all cases where companies have disobeyed its instructions to reinstate discharged employees. The decision by the NRA will remove teeth from decisions by the board, since it may now hear cases, make decisions, and find that no penalties are inflicted for disobeying its orders.

Railway Pension Law to Be Questioned

The railways do not propose to pay employees pensions as required by the recent act of Congress until the courts have passed on its constitutionality. Suit has been filed by 150 of the major companies in the Supreme Court of the District of Columbia. The brief of the carriers maintained that Congress "exceeded its powers under the commerce clause of the Constitution" in enacting the pension legislation. It was further alleged that the law illegally imposes upon the railroads the obligation to pay into the United States Treasury large sums of money; "unlawfully interferes with management; and unlawfully classifies and discriminates against the carriers." On these grounds, the railroads maintained the act violates their property rights and the liberty of contracts "without due process of law," in violation of the Constitution.

NRA Suffers Serious Legal Setback

Federal Judge Symes, at Denver, Colo., on August 9, made a decision which may have a far-reaching effect on enforcement of code provisions governing the operation of open-price plans. Judge Symes denied the Government an injunction which would have forced Ballard Gearhart, operator of a coal mine, to cease alleged violations of the NRA bituminous coal industry code. Judge Symes asserted that "The actions of the defendant in assertedly underselling price provisions of the coal code do not restrain or hinder interstate commerce and are not subject to federal regulation." The Government had charged that Gearhart, as operator of the Mount Garfield mine in Mesa County, sold coal at prices below those provided in the code, and had asked an injunction restraining him from this practice. Judge Symes not only denied the injunction, but dismissed the suit against Gearhart. In effect, the ruling held that the case was one for the state and not the federal government. "The police power of the state," the decision said, "is plenary, and the federal courts interfere only when the state, in the exercise thereof, violates some specific restraint found in the federal constitution."

U. S. Government Engineers D Crushed-Stone P

THE TENNESSEE VALLEY AUTHORITY, government agency created in June, 1933, is building two large concrete dams in the Tennessee River basin—the first of an extensive series of such structures which is designed to develop ultimately between 3,000,000 and 4,000,000 hp. of hydro-electric energy and to make the river navigable for vessels of 9-ft. draft from its mouth on the Ohio River at Paducah, Ky., to Knoxville, Tenn., a distance of 652 miles.

These initial projects are Norris dam, on the Clinch River, about 25 miles northwest of Knoxville; and Wheeler dam, on the Tennessee River just above Wilson dam of wartime prominence, near Florence, Ala. Norris dam will be primarily a storage structure, although two 66,000-hp. generators will be installed there. It will be 253 ft. high, 210 ft. thick at the base, approximately 1,800 ft. long at the crest and will be a gravity-type structure with a core wall and earth fill section at one end. It will impound a year's flow of the Clinch River, about 3,600,000

Tennessee Valley Authority's Operation for Making Crushed Stone Coarse and Fine Aggregates for Norris Dam Covers Considerable of the Landscape and Has Interesting Features

acre ft., and will create a lake which will cover 80 square miles and have a shore line of nearly 800 miles. Including the power house and reservoir site, it will cost about \$34,000,000 and is to be built in two years.

The preliminary engineering on both dams was done in previous years by the Engineer Corps of the U. S. Army and final plans were drafted by the Bureau of Reclamation in its Denver, Colo., office. Both jobs were put underway last year, work on the Norris

project having been started almost immediately after the TVA became operative.

As Norris dam site is located six miles from the nearest railroad, original plans called for the construction of a spur line at an estimated cost of \$750,000 for hauling in construction materials. In addition, a \$150,000 macadam-surface highway was projected. The discovery near the dam site of rock which could be crushed into suitable coarse aggregates and sand for concrete-

A1: Allis-Chalmers 42-in. gyratory crusher. Texrope belts driven by G-E 250-hp., 2200-v., 3-phase, 60-cycle, 900-rpm. slip-ring motor.

E1: One Jeffrey Mfg. Co. feeder, 36x66 in. One-hp. M-G set, and one 2-hp. vibrator.

B1: Robins 2-deck, 6 and 3-in. Gyrex screens 48x102 in. Century 7½-hp., 1140-rpm., 440-v., 3-phase, 60-cycle motor.

C1: 36-in. Robins conveyor, 40-in. magnetic pulley, W.E.M. Co., 60-hp., 440-v., gear motor.

D1: 36-in. Manhattan rubber belt, 8-ply, ¾-in. cover, 693 ft.

A2: Symons 5½-ft. short-head cone crusher. Falk 15C flexible coupling. G-E 200-hp., 2200-v., 3-phase, 60-cycle, 514-rpm., slip-ring motor.

B2: Niagara one-deck, 3-in. screen, 48x168 in. Century 5-hp., 1200-rpm., 440-v., 3-phase, 60-cycle motor.

B3: Stephens Adamson one-deck, 1½-in. screen, 48x96 in. Century 5-hp., 1800-rpm., 440-v., 3-phase, 60-cycle motor.

B4: Stephens Adamson one-deck, ¾-in. screen, 60x96 in. Century 3-hp., 1800-r.p.m., 440-v., 3-phase, 60-cycle motor.

B5: Stephens Adamson one-deck No. 4 screen, 60x90 in. Century, 3-hp., 1800 rpm., 440-v., 3-phase, 60-cycle motor.

C3: 24-in. Robins conveyor, 16-in. head pulley. Century 10-hp., 440-v., gear motor, 69.25 rpm. on gear.

D3: 24-in. Acme belt, 4-ply, ¼-in. cover, 28-oz. 172 ft.

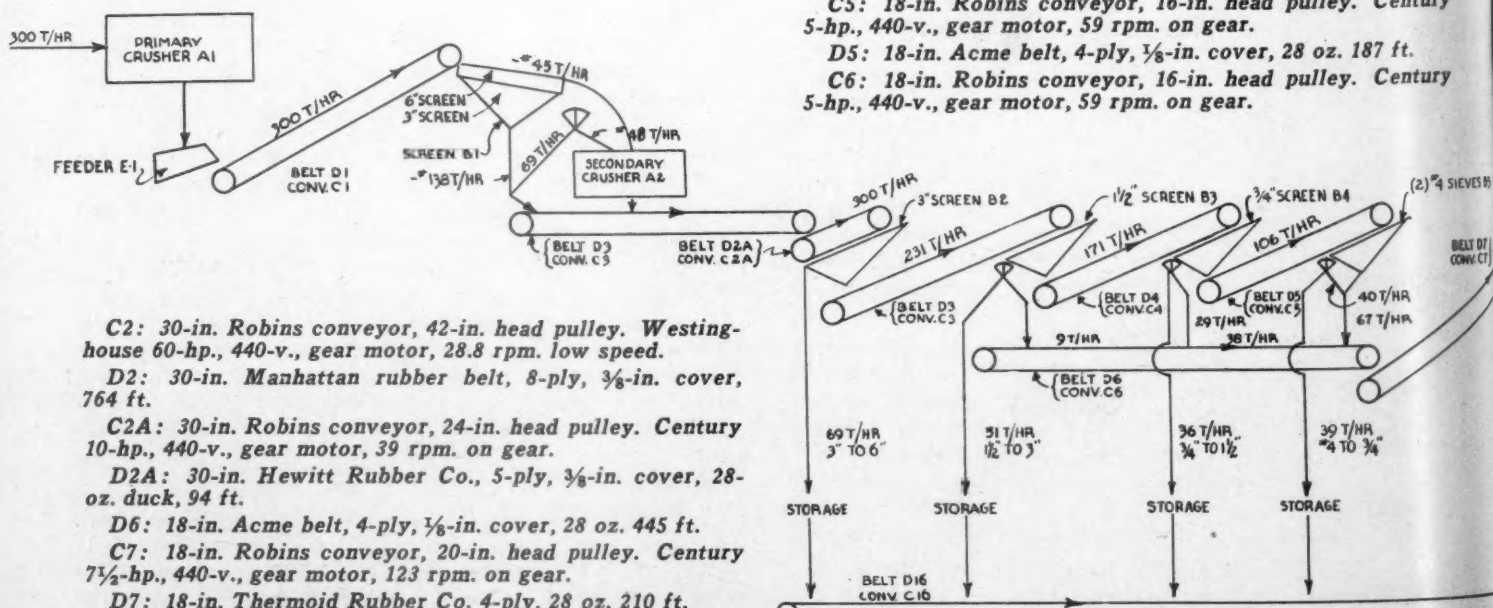
C4: 20-in. Robins conveyor, 16-in. head pulley. Century 7½-hp., 440-v., gear motor, 69.25 rpm. on gear.

D4: 24-in. Acme belt, 4-ply, ¼-in. cover, 28 oz. 187 ft.

C5: 18-in. Robins conveyor, 16-in. head pulley. Century 5-hp., 440-v., gear motor, 59 rpm. on gear.

D5: 18-in. Acme belt, 4-ply, ¼-in. cover, 28 oz. 187 ft.

C6: 18-in. Robins conveyor, 16-in. head pulley. Century 5-hp., 440-v., gear motor, 59 rpm. on gear.



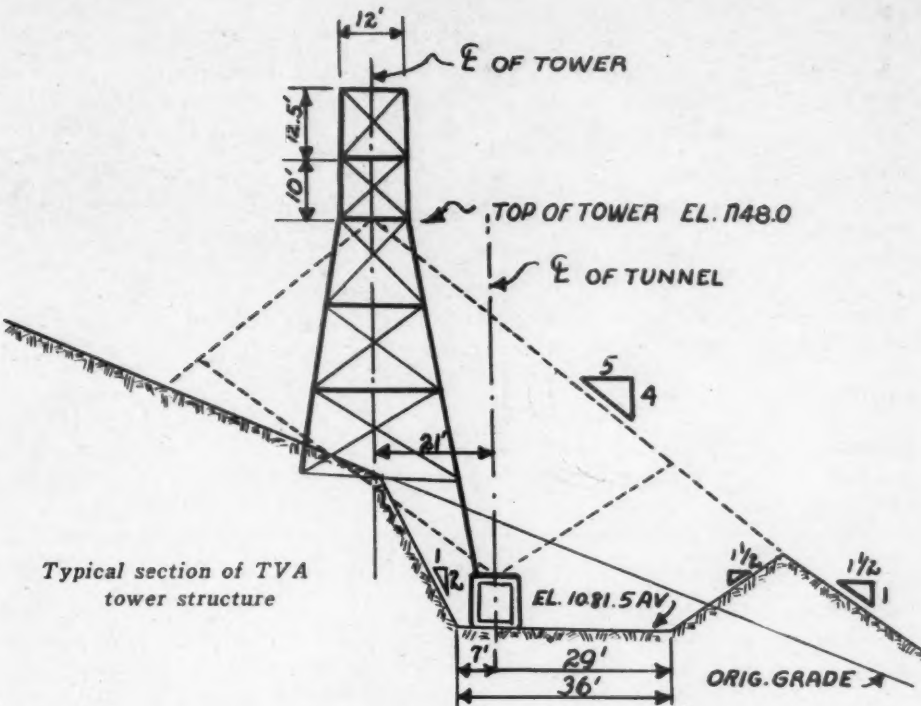
Design a Plant

● By C. H. Vivian
Phillipsburg, N. J.

making purposes eliminated the principal need for a railroad and it was accordingly dispensed with. Plans for the highway were modified and a heavy-duty reinforced-concrete structure was built at a cost of \$257,000.

Rock Deposit

The rock from which concrete aggregates are made is a dolomite which lies on the side of a draw extending back from the Clinch River a few hundred feet above the dam site. Several tons of it were sent to



Denver, where tests in the Bureau of Reclamation laboratory determined that it would make better concrete than the mate-

rials previously considered. Steps were therefore immediately taken to open up a quarry and to set up the necessary plant for supplying aggregates for the 1,000,000 cu. yd. of concrete required for the dam and power house.

As the dolomite was covered by an average of 6 ft. of clay overburden and the slope of the surface was about 30 deg., hydraulic sluicing was determined to be the most economical method of clearing the quarry site. This was done with water pumped from the river, 1,200 ft. distant and 240 ft. lower, by three 150-hp., 1750-g.p.m., electrically driven centrifugal pumps operating at 1700 r.p.m. These were connected

E2: Two Jeffrey Mfg. Co. feeders, 48x60 in. Two 1-hp. M-G. sets and two 2-hp. vibrators.

A3: Two 42x48-in. Allis-Chalmers hammermills, direct connected to two 250-hp., 2200-v., 3-phase, 60-cycle, 900-rpm., slip-ring motors.

C13: 20-in. Robins conveyor, 16-in. head pulley. Century 15-hp., 440-v., gear motor, 138 rpm. on gear.

D13: 20-in. Thermoid Rubber Co. 5-ply, 28-oz. duck. 400 ft.

C8: 16-in. Robins conveyor, 12-in. head pulley. Century 5-hp., 440-v., gear motor, 159 rpm. on gear.

D8: 16-in. Thermoid Rubber Co. 3-ply, 28-oz. 410 ft.

C10: 16-in. Robins conveyor, 12-in. head pulley. Century 3-hp., 440-v., gear motor, 123 rpm. on gear.

D10: 16-in. Thermoid Rubber Co., 3-ply, 28-oz. 335 ft.

Radial stacker: 16-in. Barber-Greene conveyor, 16-in. Diamond rubber belt.

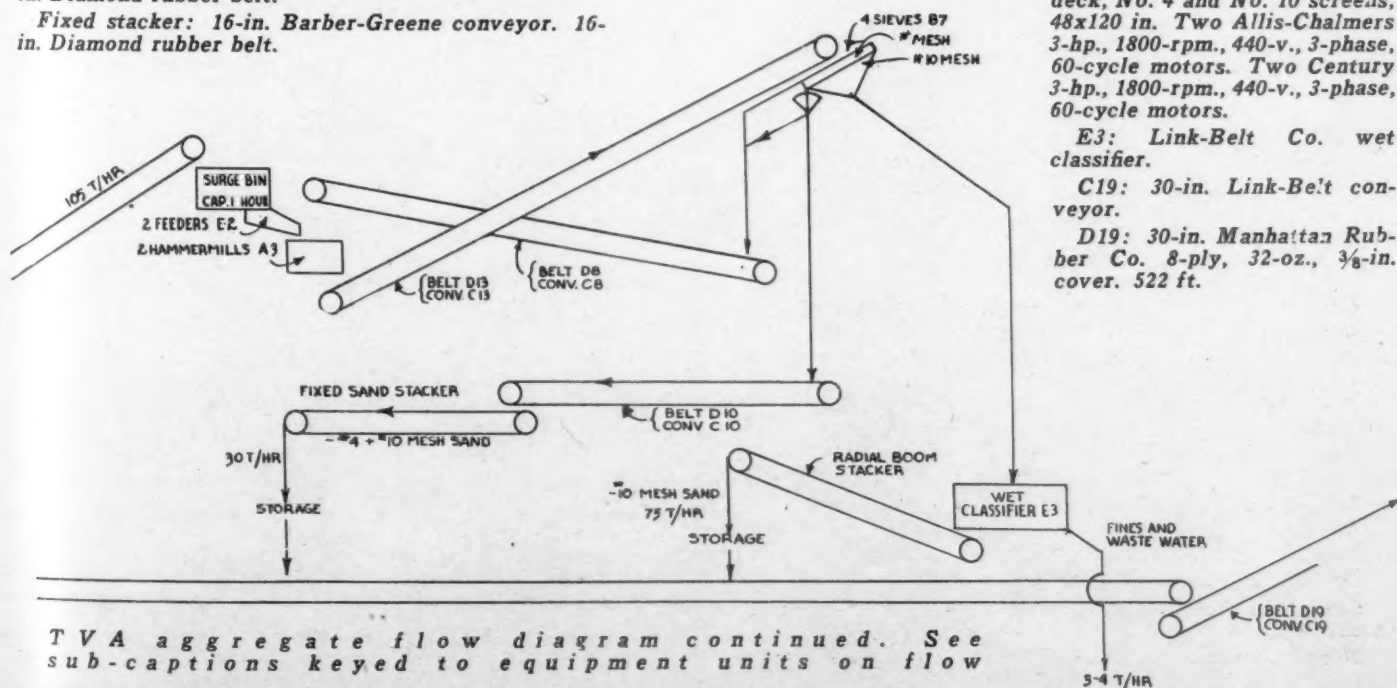
Fixed stacker: 16-in. Barber-Greene conveyor. 16-in. Diamond rubber belt.

B7: Four Allis-Chalmers 2-deck, No. 4 and No. 10 screens, 48x120 in. Two Allis-Chalmers 3-hp., 1800-rpm., 440-v., 3-phase, 60-cycle motors. Two Century 3-hp., 1800-rpm., 440-v., 3-phase, 60-cycle motors.

E3: Link-Belt Co. wet classifier.

C19: 30-in. Link-Belt conveyor.

D19: 30-in. Manhattan Rubber Co. 8-ply, 32-oz., 3/8-in. cover. 522 ft.



TVA aggregate flow diagram continued. See sub-captions keyed to equipment units on flow



Washing away overburden from TVA quarry site, Norris, Tenn., by sluicing. A 100-lb. pressure through a 3-in. nozzle is used for this work

in series, one being stationed at the river bank and the other two at the quarry site. The quarry face was cleared for a length of 1000 ft. and a height of about 300 ft.,

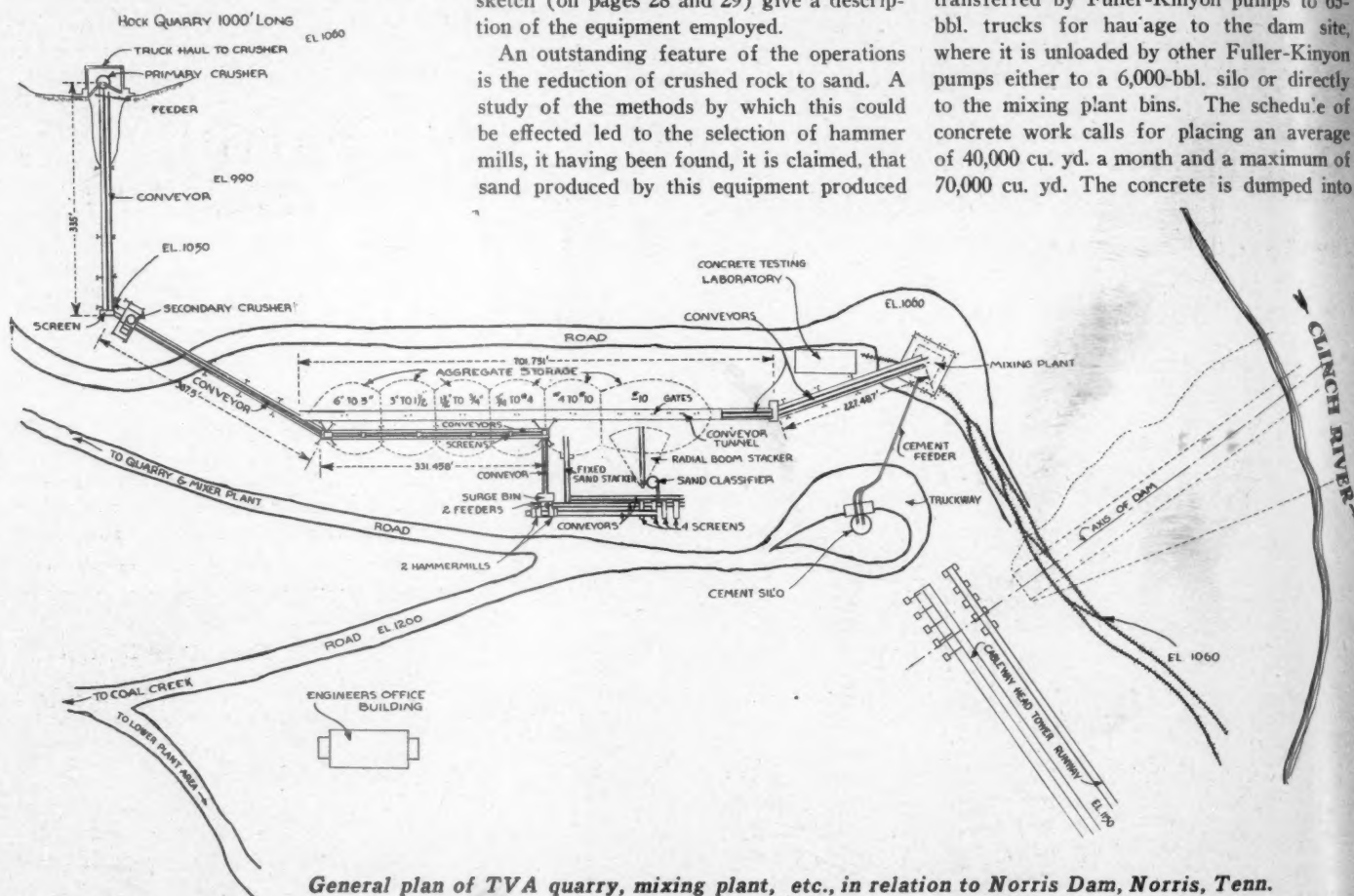
and two sizes of sand. Accompanying drawings show the general layout of the plant in which this is done and the flow of the materials. Captions accompanying the latter sketch (on pages 28 and 29) give a description of the equipment employed.

An outstanding feature of the operations is the reduction of crushed rock to sand. A study of the methods by which this could be effected led to the selection of hammer mills, it having been found, it is claimed, that sand produced by this equipment produced

the most workable concrete. "This is primarily owing to the cubical shape of the grains," states Barton M. Jones, engineer in charge of the construction. "The cost of maintenance will be higher than for some other types of equipment, but the better sand will result in an appreciable saving in the amount of cement required. This will materially reduce the cost of the concrete and give the advantages of lower temperatures through a decreased amount of heat generated in the concrete."

Approximately 425,000 cu. yd. of sand and 825,000 cu. yd. of coarse aggregate will be produced in this plant.

The concrete-mixing plant has a capacity of 3,000 cu. yd. a day. Cement is delivered in bulk by railroad cars to silos at Coal Creek, the nearest railroad point. It is transferred by Fuller-Kinyon pumps to 65-bbl. trucks for haulage to the dam site, where it is unloaded by other Fuller-Kinyon pumps either to a 6,000-bbl. silo or directly to the mixing plant bins. The schedule of concrete work calls for placing an average of 40,000 cu. yd. a month and a maximum of 70,000 cu. yd. The concrete is dumped into



General plan of TVA quarry, mixing plant, etc., in relation to Norris Dam, Norris, Tenn.

and a roadway for haulage was cut at the bottom. The rock is drilled with wagon drills and, after blasting, is loaded by a Bucyrus-Erie 120-B and a Marion 4101 electric shovel, both equipped with 3-cu. yd. dippers. Haulage to the primary crusher is done in 12-cu. yd. White and Hug trucks.

Stone Sand Used Exclusively

From the primary 42-in. crusher at elevation 1060, the material is conveyed across the draw to the secondary crusher at elevation 1050 and then follows the side hill around towards the concrete mixing plant, meanwhile being reduced in straight line operations to four sizes of coarse aggregate

Below: Near Norris dam—View of quarry with overburden partially washed off



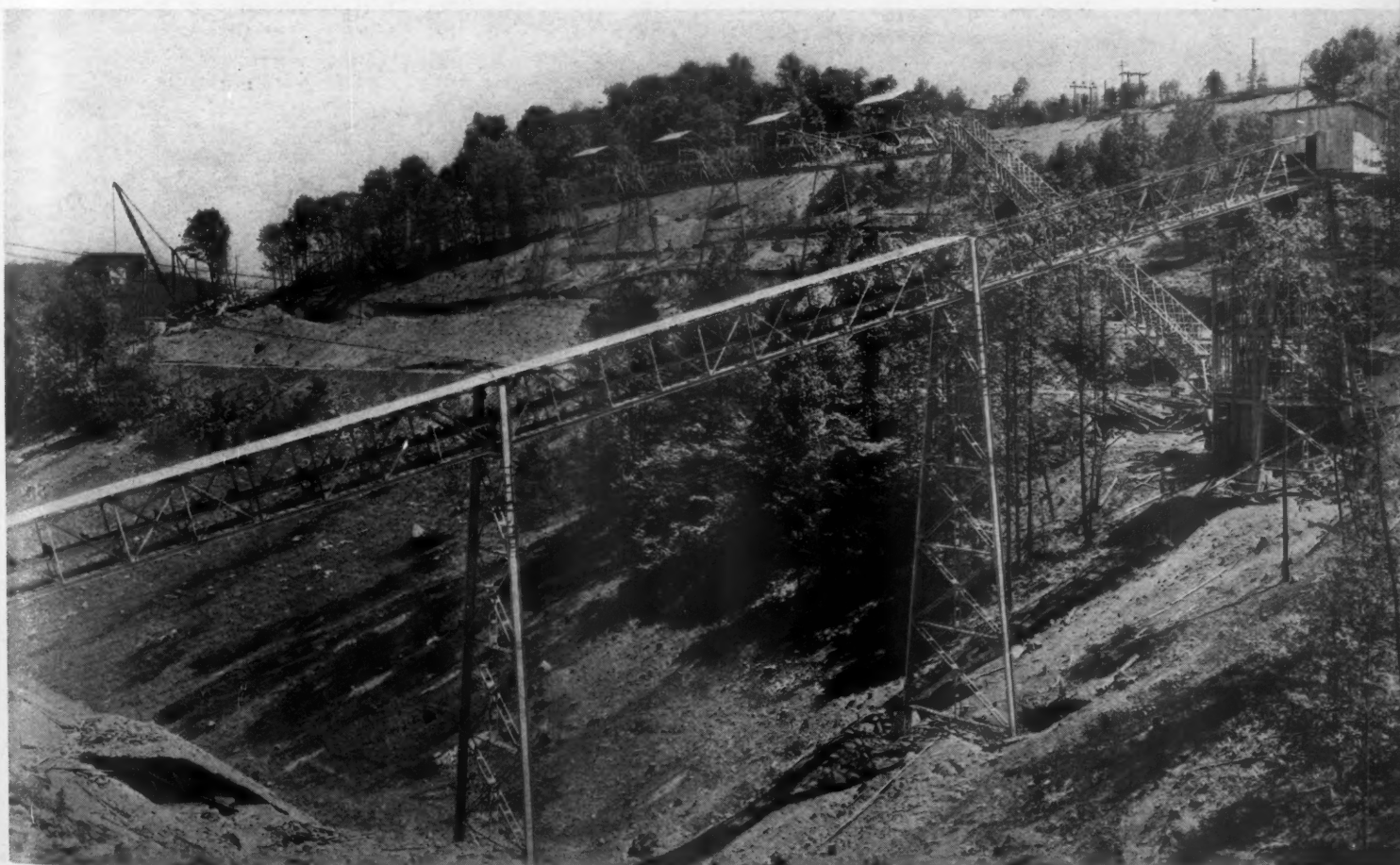


Quarry face (left) with conveyor system leading around to TVA mixing plant (center tower). In the distance are the tall towers of the two cableways for handling the concrete for Norris Dam, Norris, Tenn.

transfer cars which are hauled by gasoline-driven locomotives into position beneath the cableways, where it is poured into 6-cu. yd.

bottom-dump buckets for placing in the forms. The layout of this transportation system and its relation to the aggregate plant

are shown in the accompanying general layout sketch. The first concrete was placed on July 17.



Crusher and conveyor system under construction by TVA for furnishing aggregates used in Norris dam project

Stock Piling and Storage of Aggregates In the Great Plains Region

Where, When and How to Use Belt Conveyors, Locomotive and Crawler Cranes and Drag Scrapers

By John H. Ruckman,
Consulting Engineer, Topeka, Kan.

ONE of the most striking features of the aggregate plants of the plains taken as a whole is their enormous potential capacity, as compared with actual production. A few years ago one group of plants which was shipping about 450,000 tons a year, had a maximum capacity well over 7,200,000 tons. A large part of this over-capacity was due to useless duplication, but some of it was based on sounder principles.

For example a certain plant during its busiest month ran 300 hours using a 10-in. pump. Had an 8-in. pump been used it would have run 600 hours, and would have saved some \$500 in electric power. On the other hand, the crew of the plant consisted of five men with a total rate of hourly pay of \$2.50. The increased labor charge would thus have amounted to \$750. There are other factors, but this matter of labor cost alone accounts for the habitual selection of large capacity equipment, and until recently for the general absence of stock piles.

Where stock piles are not used to aid in evening up load they are generally accumulated to take care of business during shut-downs. A study of contracts awarded by months in 1932 in the 10th Federal Reserve District (Dodge) indicates that the seasonal percentages are as follows:

January	6.69%
February	6.52%
March	11.68%
April	9.11%
May	8.87%
June	13.32%
July	8.87%
August	10.05%
September	7.79%
October	6.70%
November	5.43%
December	4.96%

The demand for sand and gravel does not vary directly with the contract awards. If we assume that the demand under each contract persists for three months and that the demand for aggregate varies with the total amount of the contracts let (which is very nearly the case over a five-year period) the demand is divided as follows:

January	5.7%
February	6.1%
March	8.3%
April	9.1%
May	9.9%
June	10.4%
July	10.4%
August	10.8%
September	8.9%

October	8.1%
November	6.6%
December	5.7%

It will be seen that the heaviest demand is only about twice the lightest. If a plant is to produce 300,000 tons per year, its heaviest monthly production need be only 33,000 tons, an amount which can be easily produced by a 10-in. pump in 300 hours, and which can be produced, net, in 600 hours' operation, even if half be returned to the river as has frequently been the practice. As a matter of fact most plants now in operation work only about 300 hours even during their peak periods in June and July.

Nature of Materials Prime Cause of Stockpiling

In other words, were irregularity in gross demand the only consideration, stock piling would be unnecessary and inadvisable. A more important factor is the nature of the material pumped. Let us suppose that "pump-run" material (after heavy boulders have been removed) analyzes as follows:

Screen	Cumulative	Non-cumulative
on 3/4-in.	1.000%	1.000%
3/8-in.	2.665%	1.665%
4-mesh	9.565%	6.900%
8-mesh	33.265%	23.700%
14-mesh	67.265%	34.000%
28-mesh	83.865%	16.600%
48-mesh	96.865%	13.000%
100-mesh	99.000%	2.135%
Through 100-mesh .....	.....	1.000%
Gradation	393.490	100.000

One hundred thousand tons of this material can be broken up to produce 42,835 tons of road gravel with a gradation factor of 4.59; 13,270 tons of concrete aggregate with a factor of 4.03; 32,490 tons of building sand with a factor of 3.71, and some 1400 tons of engine sand. If these products were loaded out, one at a time, and the by-product rejected into the river or pond, the amount of material handled for a given production would be at least twice that were the material saved, while the execution of a large order for one material would so cover the raw material with by-product as ultimately to render it unusable.

There is no plant or even group in the Plains region at this writing in which production is so large as to permit continuous loading of all products, without either storage or waste. Accordingly, if waste and subsequent redredging is to be avoided, stock-

piling is absolutely essential. The size of the stock pile is not dependent on seasonal construction activity, but on the degree to which it is possible to substitute one product for another, and the maximum length of time during which a single product may accumulate.

When this was written, excluding the plants close to Kansas City and Omaha, there were only three plants in the area under consideration designed with the idea of carrying a stock pile. These include a belt conveyor layout in Wichita, a second in Topeka, and a drag scraper installation in Nebraska. There is also a plant in Topeka which was required to store its waste sand and subsequently found it very profitable to do so, but it was not originally laid out with that end in view.

The experience of those plants that have stockpiles, coupled with the by-product problem just described, is forcing a more general consideration of storage. There are at least three points in the state of Kansas where productions of 300,000 tons per year may be attained, and plants of this magnitude, for their own protection, must eliminate waste. As a consequence the development of stock piles seems the next logical step in plant design.

Early Stockpiling Methods

Before taking up the probable trend of this development it may be well to note some of the rather crude methods which have been tried. There was little attempt at stockpiling before the introduction of the "spread table." With the tightening of specifications in 1927 and 1928 there came about a marked increase in the amount of material discarded, and serious controversies arose at several points relative to maintenance of stream channels; indeed several plants were forced to discharge material from their waste flumes into piles located on shore.

Practically all of the first piles were formed by sluicing, since this required no serious initial investment. As the piles grew larger and higher, however, it was necessary to spread them, and it was soon discovered also that the material could be sold at an excellent profit. As a result, rehandling devices quickly appeared, notably the drag scraper, because of its low first cost, and the abundance of cable always available, and a little later the "crawler" crane. One plant sluiced its waste to a large depression whence

it drained to the river, the dry sand was recovered with a drag scraper, and was loaded out with a small belt conveyor. Another handled its entire tonnage with a "crawler," which at times climbed to the top of the pile, and not only stored and loaded but also moved the material. By 1930 practically every operator had some kind of a stock pile and nearly all handled it in part at least with a "crawler."

There can be no question as to the value of a crawler crane about a sand plant. It is an appliance that is not only highly flexible in its application but when standing in one place and loading cars is one of the most economical and effective machines known. It is, however, not adapted to transport materials. A machine with a 50-ft. radius of action can move material only about 75 ft. from a given set-up, and this may mean ten rehandlings to reach the end of the stockpile. A 10-in. pump can, and frequently does, produce 200 tons per hour. To handle one-half of this quantity once in one hour requires a 20-ton crane and a good crane man. It is often impossible with a 60-ft. boom. If it must be handled at two points, or if rehandling is required, the crane can keep up only by working extra shifts. Because of these characteristics it seems unlikely that the crane, unaided, is the solution of the problem.

"Borrowed" Railway Cars

It has been suggested that the cheapest storage cost is obtained when railroad cars are "borrowed" during the "demurrage free" period, loaded, shifted to stock pile, unloaded and reshifted to load out. So far as the writer knows, this method has never been used in the Plains region. It is perhaps a good thing that it has not, for unless the railroad has made some car rental agreement, which has been approved by public authorities, the operation may constitute an intraterminal movement for which the charge amounts to \$9.30 per car. The omission of this charge on an interstate shipment lays the shipper open to severe fine and imprisonment.

Even supposing that a car rental agreement can be made, the method is neither convenient nor in most cases is it cheap. As already pointed out, a crane cannot as a rule handle half the production of a well-placed pump, unless it is equipped with a short boom and suffers no delays. When unloading cars its capacity is further reduced. As a result, the necessary trackage (including switches) is excessive. Car-switching equipment is expensive and becomes complicated, but the most serious objection to the system (always provided the legal difficulties already mentioned can be overcome) is the high labor cost. The cars have to be caulked before loading. After unloading they must be recaulked and frequently cleaned by hand shoveling. Men are required to operate switches and haulage equipment, and there are apt to be delays at the tipple. In the

opinion of the writer, even though railroads and regulatory commissions agree, this method is suitable only for very large plants.

Repumping

Another system that naturally suggests itself to experienced dredgers is that of repumping to stock pile. This system has been used to some extent and is worth considering. To stock-pile 100 tons an hour requires an 8-in. pump and motor, a string of pipe and a series of supports. If the material has been partially dewatered, clear water must be remixed with it and this constitutes one difficulty, since the amount of water used is so great as to be drawn off only with difficulty. One concern located on a river bank placed its classifying cones outside the flood protection dike and allows each cone to form its own pile, the drainage going into the river. This is certainly a cheap method of creating stock piles, but it is ill adapted to cheap loading out. Where the material is repumped it can be dewatered before storage, but the drawback to this system is the heavy power and replacement costs. The total head against the pump will often amount to 70 ft. and will require 80 hp. as compared with a quarter of this amount, if the same material were carried by belt conveyor. Impellers will not pump more than about 150,000 tons each, and pipe will wear out at about twice that tonnage.

The first cost when pump, motor, pipe, flumes and dewatering apparatus are taken into consideration differs little from that of a belt conveyor, although the pipe can be made partially self supporting, thus avoiding the cost involved in overhead trusses.

Overhead Rail Cars

Systems based on automatic dump cars and on overhead cableways offer little. If the cars are supported on trusses high enough to form adequate piles the installation is more expensive than belts, while high cableways will generally prove more expensive than drag scrapers.

Drag Scrapers

For small plants the last named device is very effective. Its chief drawbacks are its comparatively small capacity where long piles are to be formed, and the necessity of the operator giving it his entire attention. Where the stock piles are small, and where there are frequent shut-downs for "no orders," neither of these drawbacks is serious. The system has a very great advantage in permitting the material to be loaded out as well as into storage, while its low initial cost results in low overhead.

Belt Conveyors

For plants of larger capacity, the belt conveyor offers the most convenient system, and when properly installed it should prove the cheapest. The actual cost of a 24-in. conveyor with anti-friction bearings and a good quality of belt is about \$10 a foot, exclusive of supports. The supporting structure can

however take a multitude of forms, and upon it largely depends both the first cost and the subsequent satisfactory operation of the system.

One of the most common types is a trestle with rather light wooden bents about 20 ft. apart. These bents are seldom over 40 ft. in height. Where a "tripper" is used a long storage pile can be developed, but the results are often unsatisfactory since the bents obstruct the flow of material in the pile, and when loading out begins, the pressure of the material frequently breaks them down. For this reason steel trusses are better than wooden trestles. Since two 2½x2¼-in. angle irons can be used safely as a 7-ft. strut, and since a depth of one-twelfth of the span generally gives an economical design, trusses of 80 to 85 ft. span are very common. These trusses are generally supported by steel bents and several methods can be used for protecting these from the flow of the stored material. One is to make them strong transversely and then so operate that sand is always drawn equally from each side in a longitudinal direction. For instance, if the pile is to be withdrawn through a tunnel, hatches may be located at each bent, drawing material from both sides; and a crane can operate from a point opposite the bent so as to achieve the same result. This system works very well where the material is uniform.

A second system uses heavy bents and depends on the trusses to hold the bents in place. This method is one which the writer dislikes, since it requires heavy trusses, since it involves very laborious calculations due to possible stress relations, and finally since it is often hard to anchor the tops of the bents securely. A great many failures have occurred, and it seems safer where different classes of material are to be stored to so arrange the bents that they cannot receive the thrust of the pile.

Saving Trestle Bents from Thrusts of Piled Material

This result can be obtained in several ways. The most direct method is to lengthen the spans. If full use is made of the cantilever principle a 160-ft. span can be built just about as cheaply per foot as a span of 80 ft. By placing the footings of the bents on adequate retaining walls, it is possible to develop a nearly continuous pile in which the bents are entirely free from the material. The same result can be obtained by spreading the legs so as to straddle the pile, but the layout is unsightly and interferes with the operation of a crane if the latter is used to load out.

Another method is to run the main belt on a relatively low wooden trestle and discharge at certain points to reversible cross belts which are anchored to heavy foundations and then cantilevered out to form large circular piles. This construction will save about \$7 per ft. on the main conveyor supports, but it involves an equally large expenditure for additional belts and cantilevers. The amount

of storage is, however, very nearly doubled as compared with a single belt carried on trusses.

Bins and Silos

Up to this point no mention has been made of artificial aids to storage such as bins, tanks and retaining walls. It may be safely assumed that there is no location in the district under consideration where any of these structures would pay from a standpoint of permanent storage. At no point is land worth more than \$1,000 an acre, and as a result, direct ground storage is in every case cheaper than storage behind walls. Likewise with sand figured at 30c a cu. yd., the cheapest retaining wall will practically always be a sand fill.

Loading Out of Stock Piles

Getting material into a stock pile is, of course, only half the problem. Loading out is equally important. The cheapest method so far as direct handling is concerned is undoubtedly a conveyor carried in a tunnel beneath the pile. The cost of such a conveyor, however, is some \$10 per ft. plus the cost of the tunnel, which will amount to about \$8 per ft.; and the tunnel even when carefully designed will recover only a little more than half the stock pile. In one case figured by the writer (Fig. 1) the recoverable storage amounted to about 60 tons per foot of storage pile, and allowing for the gaps between piles there was over \$1 of investment per ton stored. The outgoing conveyor in this case was 900 ft. in length, of which 800 ft. was in tunnels; the total cost thus amounted to \$15,300, about that of a 20-ton crawler or locomotive crane. At the plant in question, there is however no opportunity to use a crane, due to the truck layout. In Fig. 2 is shown another layout in which direct loading by conveyor is provided. This plant, when partially constructed, had a crawler loading out, recovering about four-fifths of the material in each pile. Investment here, due to the single conveyor across the piles is lower than in Fig. 1, but the cost of operating the crane was rather high, due chiefly to worn treads.

Locomotive vs. Crawler Crane

This brings up the question of whether use of a locomotive crane would be preferable. Such a machine can run from one end of the pile to the other with little wear, and in addition can act as a switcher and car puller. These advantages, however, are gained only in return for a serious loss of adaptability. The locomotive crane cannot leave its track, and hence its boom has only half the reach of a crawler of the same capacity. It can

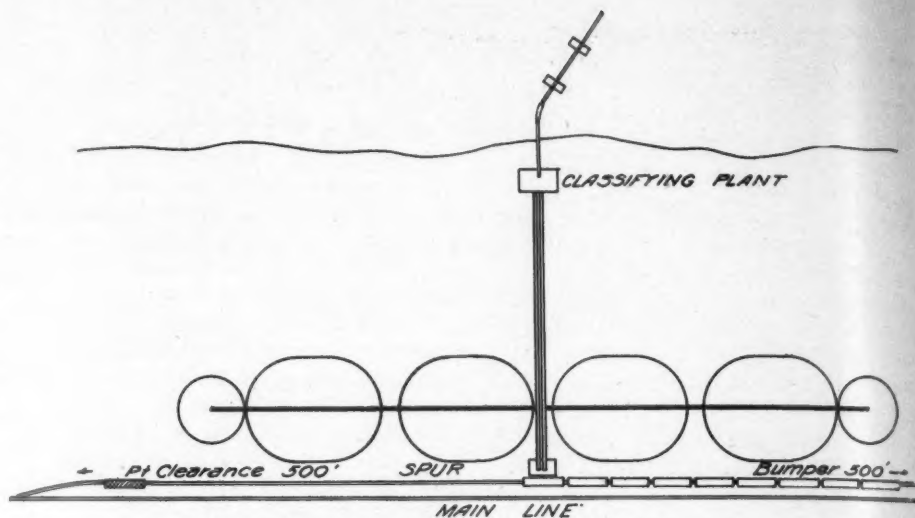
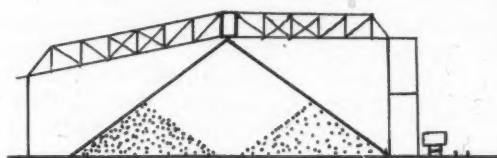
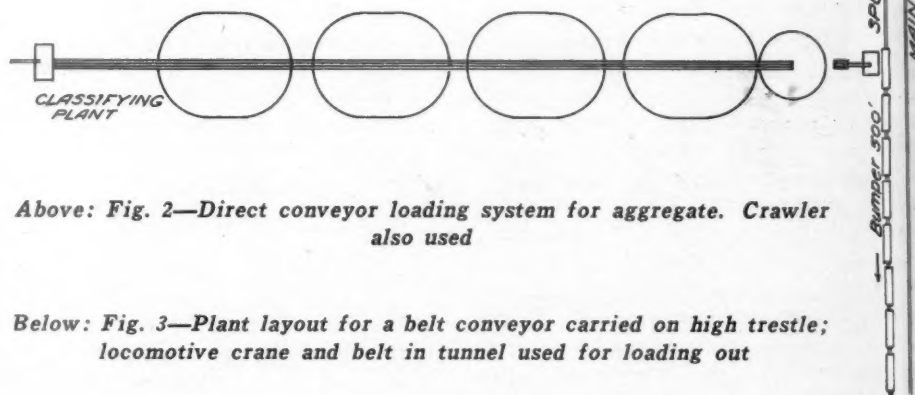


Fig. 1—Tunnel conveyor system. No crane used

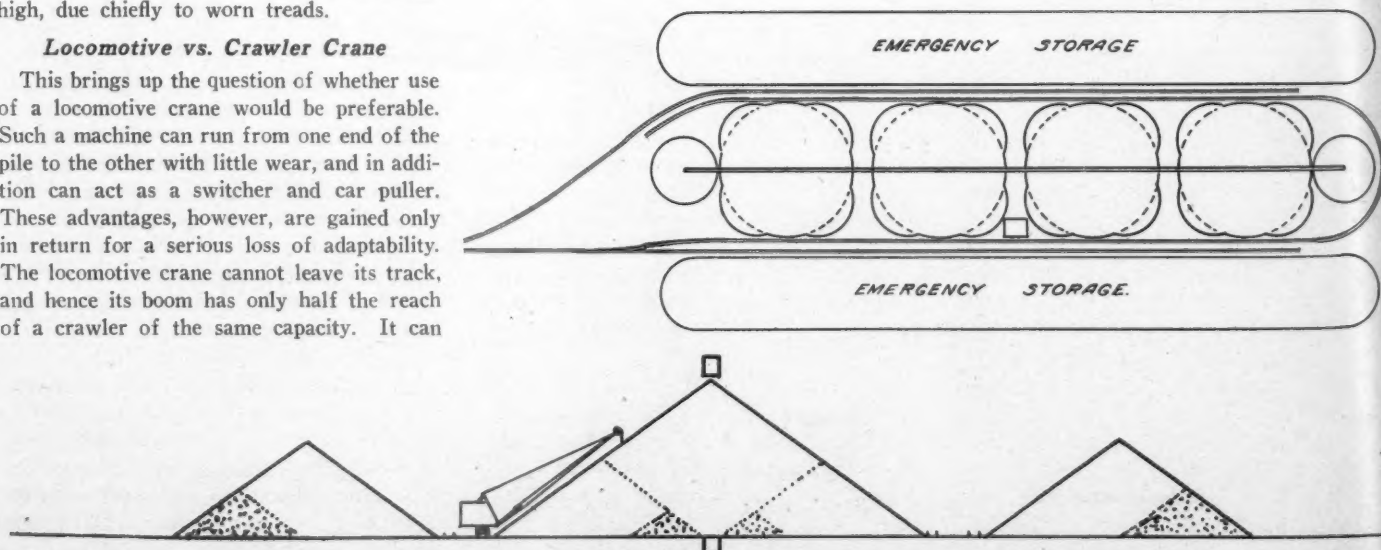


Cross section of stock piles and conveyor system shown in Fig. 1



Above: Fig. 2—Direct conveyor loading system for aggregate. Crawler also used

Below: Fig. 3—Plant layout for a belt conveyor carried on high trestle; locomotive crane and belt in tunnel used for loading out



Cross section of trestle-and-tunnel conveyor system for aggregates shown in Fig. 3



Cross section of conveyor system shown in Fig. 4 designed to meet emergency storage needs

in general load only one car at a time, on the same track with itself and cannot go out on to the main line. As a result an additional track is necessary and this will cost at recent prices some \$3.50 per ft. If the crane is to be used at its maximum reach it is necessary to increase the distance between the tracks, sufficiently to allow the crane to turn clear round.

Flexibility Feature

If a plant is to load out 5,000 cars a year, it should be able to load at least 2,000 of these by direct loading. If the plant is one-eighth of a mile in length, and if the crane is obliged to travel the whole length of the plant for each car (an almost impossible condition), it will travel in one year only 375 miles. A good crawler should be able to travel five times that distance before re-bushing is required. In other words, if reasonable care is used in operation, and if it is not asked to transport material, the crawler crane is not only more flexible, but it avoids heavy additional investment in track.

Size of Stock Piles

As pointed out, the size of the stock piles must be made dependent on the maximum amount of by-product which may develop between orders. There is a tendency for sand which will pass a 8-mesh but will stop on a 28-mesh to accumulate in very large quantities at some plants, and no matter how large the piles are designed, it may be necessary to enlarge them. For this work the drag scraper is unexcelled. An ordinary crane can furnish the necessary power, and by means of temporary or permanent tail block anchorages any given pile can be extended. In Fig. 4 is shown a plant laid out on this principle. A crawler could be substituted for the locomotive crane and extra track shown, and it is doubtful whether the tunnel and conveyor indicated would pay except in so far as they permit two materials to be loaded out at once. Some readers from the South may notice that although the layout differs in detail, the general arrangement is very similar to that of the Fort Worth Sand and Gravel Co. at Hearst, Tex.

Another layout is shown in Fig. 5, in which a large initial storage is obtained, and in which full use is made of the long reach of a crawler's boom. Auxiliary storage can be built up and extended as in the previous layout. The central loading out belt as a rule can be omitted, but there is at least one location where trackage cannot be brought into the plant and where as a result loading out must be done by conveyor.

Conclusions

In considering these various combinations of conveyors, tunnels, trusses and belts it

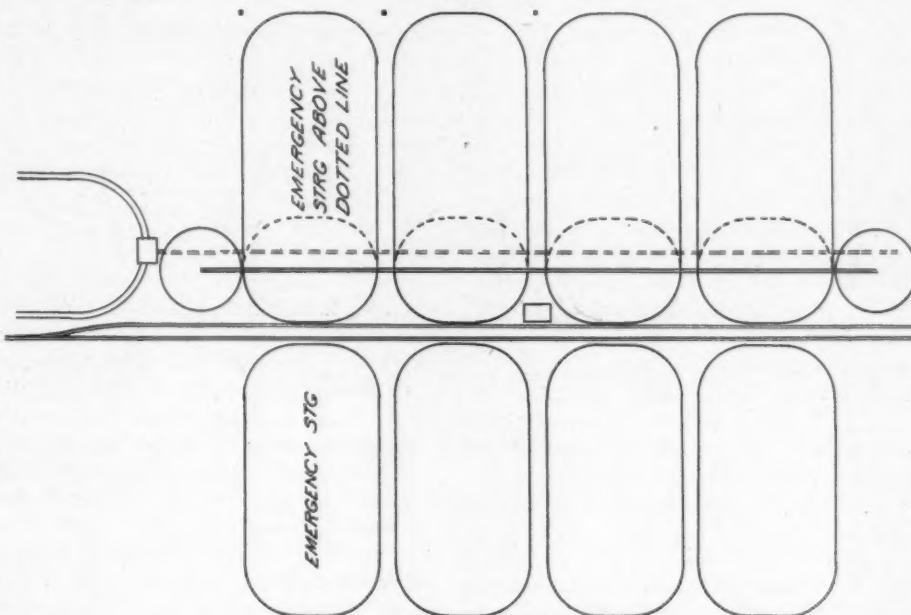
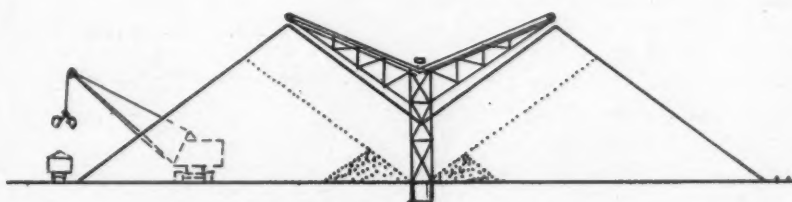


Fig. 4—Extra track is a feature of this plant layout sketch developed to meet extra storage demands of plant



Cross section of plant layout shown in Fig. 5 designed to provide large initial storage in stock piles

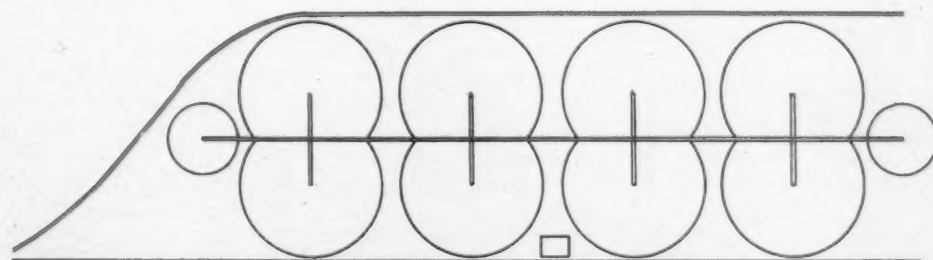


Fig. 5—Aggregate plant's stock pile and loading facilities arranged for rapid and economical development of storage

cannot be said that any is the best. The layout must be suited to the particular plant in question, and the choice will nearly always have to be made between a relatively inflexible system giving very low costs at certain rates of production, and more adaptable methods involving higher direct costs, but

which because of small investment, adaptability to emergency or resale value may be more economical in the long run. One thing is, however, certain: during the next ten years plants which save and stock pile their by-products are going to survive at the expense of their less progressive neighbors.

Combustion Economy in the Rotary Kiln

Part 2—Theory of Combustion*

By Robert S. Schultz, Jr.,

Consulting Engineer, Maplewood, N. J.

COMBUSTION has been defined as: "The combination of certain chemical elements with oxygen which takes place with sufficient rapidity to be accompanied by the phenomena of heat and light."

The principal combustion elements are carbon, hydrogen and sulphur. Oxygen, necessary for the combustion of these elements, is provided, in rotary kiln practice, from the air, which is a mechanical mixture and not a chemical compound.

Combustion is a chemical process or reaction. It occurs in definite and invariable proportions and with definite heats of reaction, which may vary considerably depending on the temperature at which the reaction occurs and on whether the reaction occurs at constant pressure, as in the rotary kiln, or at constant volume, as in the determination of the heat value of a fuel in a bomb calorimeter. Certain heats of reaction are positive or exothermal—give off heat—while others are negative or endothermal—absorb heat. In a study of combustion for the production of heat, we are particularly interested in those combustion reactions which are exothermal.

The important chemical reactions in fuel combustion in the rotary kiln are shown, together with their heats of reaction under standard conditions and at constant pressure, in Table 1.

In any study of combustion much the most important of these several reactions are the complete oxidation of carbon and of hydrogen to carbon dioxide and water vapor, respectively. These two elements are the principal constituents of all commercial fuels and their complete oxidation is the aim of heat producing combustion.

It is desirable to distinguish between "complete" combustion and "perfect" combustion. "Complete" combustion covers the complete oxidation of a fuel, regardless of the amount of excess air which may be used in such oxidation. "Perfect" combustion covers complete oxidation of a fuel with exactly the amount of air, and hence the oxygen which is theoretically required for such oxidation.

It is to be noted particularly that oxygen, in one form or another, is the element of

essential importance in all of the practical combustion reactions. Since no chemical reaction occurs until the elements are in contact, it follows that combustion cannot occur until the combustible and oxygen are in actual contact. Therefore, the mechanics of the combustion of any fuel consists of two distinct and consecutive processes:

(1) The process of contacting the combustible with oxygen.

(2) The chemical combination of the combustible with oxygen, after contact has been made.

Of these two processes, the first is far the slower and more difficult. Time is necessary for the combustible and oxygen to make contact. But once contact has been made, the actual chemical combination is practically instantaneous at usual burning zone temperatures and pressures.

As already stated, the speed of combustion reactions depends on the temperature at which the reaction occurs and whether the reaction occurs at constant pressure or at constant volume. Under rotary kiln conditions, the temperature at which the reactions occur is high and the pressure is

TABLE NO. 1.—IMPORTANT FUEL COMBUSTION REACTIONS.

Elements	Products	Reaction Molecular Weights	Heat of Reaction B.t.u. per lb. mol.
Carbon plus oxygen	Carbon dioxide	$C + O_2 = CO_2$ $12.0 + 32.0 = 44.0$	169,860 B.t.u.
Carbon plus oxygen	Carbon monoxide	$2 C + O_2 = 2 CO$ $2 \times 12.0 + 32.0 = 2 \times 28.0$	95,120 B.t.u.
Carbon plus carbon dioxide	Carbon monoxide	$C + CO_2 = 2 CO$ $12.0 + 44.0 = 2 \times 28.0$	-74,740 B.t.u.
Carbon monoxide plus oxygen	Carbon dioxide	$2 CO + O_2 = 2 CO_2$ $2 \times 28.0 + 32.0 = 2 \times 44.0$	244,600 B.t.u.
Hydrogen plus oxygen	Water vapor	$2 H_2 + O_2 = 2 H_2O$ $2 \times 2.015 + 32.0 = 2 \times 18.015$	246,150 B.t.u., gross 208,136 B.t.u., net
Methane plus oxygen	Carbon dioxide plus water vapor	$CH_4 + 2 O_2 = CO_2 + 2 H_2O$ $16.031 + 2 \times 32.0 = 44.0 + 2 \times 18.015$	380,200 B.t.u., gross 341,936 B.t.u., net
Ethane plus oxygen	Carbon dioxide plus water vapor	$C_2H_6 + 3\frac{1}{2} O_2 = 2 CO_2 + 3 H_2O$ $30.046 + 3\frac{1}{2} \times 32.0 = 2 \times 44.0 + 3 \times 18.015$	664,450 B.t.u., gross 607,043 B.t.u., net
Sulphur (as gas) plus oxygen	Sulphur dioxide	$S_2 + 2 O_2 = 2 SO_2$ $64.12 + 2 \times 32.0 = 2 \times 64.06$	249,400 B.t.u.
Sulphur (as gas) plus oxygen	Sulphur trioxide	$S_2 + 3 O_2 = 2 SO_3$ $64.12 + 2 \times 32.0 = 2 \times 80.06$	329,400 B.t.u.
Carbon plus water	Carbon monoxide plus hydrogen	$C + H_2O = CO + H_2$ $12.0 + 18.015 = 28.0 + 2.015$	-75,515 B.t.u., gross -56,508 B.t.u., net
Carbon plus water	Carbon dioxide plus hydrogen	$C + 2 H_2O = CO_2 + 2 H_2$ $12.0 + 2 \times 18.015 = 44.0 + 2 \times 2.015$	-76,290 B.t.u., gross -38,276 B.t.u., net
Carbon monoxide plus water	Carbon dioxide plus hydrogen	$CO + H_2O = CO_2 + H_2$ $28.0 + 18.015 = 44.0 + 2.015$	-775 B.t.u., gross 18,223 B.t.u., net

Molecular weights from International Atomic Weights, 1926. Data based on 60° F. and 29.92" Hg.

Heat of reactions calculated from International Critical Tables.

Latent heat of water vapor taken as 1055 B.t.u. per lb.

close to atmospheric and is reasonably constant. Under these conditions, a theoretical study of combustion reactions will show theoretical combustion velocities, but these velocities are so extremely high that, for all practical purposes, combustion reactions in rotary kiln practice may be considered as instantaneous.

Contacting Fuel and Oxygen

Control of the contacting of the combustible and oxygen is the most difficult problem in efficient combustion. It is also the major factor in determining the character and temperature of the flame to be produced.

The physical nature of the fuel is an important factor in the contacting problem. In the case of natural gas, and similar gaseous fuels, both the combustible and the oxygen are in a molecular state and are easily susceptible to mixing and to the formation of nearly homogeneous mixtures. Only about ten volumes of air, per volume of gas, are required for perfect combustion. Pulverized coal, on the other hand, is in the solid state, and although the particles may be very small they are large when compared to the oxygen molecule; and a great number of oxygen molecules is required for perfect combustion. At usual burning zone temperatures, the volume of air required for the perfect combustion of a coal particle is many thousand times the volume of the particle.

From a practical standpoint, the entire time required for the combustion of any fuel in the rotary kiln is the time required for contacting the combustible and the oxygen.

Two means are available for this essential stage in rotary kiln combustion:

- (1) Natural diffusion.
- (2) Mechanical mixing and agitating.

When natural diffusion is depended on to bring the oxygen into contact with the combustible, the time of contacting is long, combustion is slow and resulting temperatures are low. Intensive mechanical mixing and agitating, both before and after admission to the kiln, greatly increase the speed of the contacting process and aid in the removal of the products of combustion from the surface of the combustible. With the time of contacting decreased, the rate of combustion and the resultant temperatures are increased. Whenever high rates of combustion and high temperatures are obtained, they result from intensive mixing. High combustion temperatures are the result and not the cause of high rates of combustion.

The problem of contacting in combustion, therefore, divides itself into two separate and distinct problems:

(1) To provide sufficient air (and hence sufficient oxygen) for the designed combustion of the fuel.

(2) To bring this amount of air and the fuel into contact in such a way and at such a rate as to produce the type of combustion

desired for the particular process involved.

Due to the fact that the chemical reactions involved in combustion occur in definite and invariable proportions and that the average oxygen content of the air is known, the quantity of air required for the combustion of any fuel can be determined accurately from a chemical analysis of that fuel.

The average analysis of atmospheric air is:

	By Volume
Oxygen, O ₂	20.92%
Nitrogen, N ₂	78.14%
Carbon dioxide, CO ₂	0.04%
Argon, A	0.90%

Total inert gases..... 79.08%

The molecular weight of air is 28.97.

Since the composition of any fuel will vary slightly, it is sufficiently accurate, for usual combustion calculations, to take the average composition of air as 21% oxygen and 79% nitrogen, by volume, and to take the molecular weight as 29.0.

Except for unusual combustion processes, such as the production of a reducing flame for certain metallurgical processes, complete combustion, and as near perfect combustion as may be practical, is desired from the standpoints of economy and efficiency. In cement kiln practice, it is customary to consider combustion to be complete if the exit gases do not contain combustible material and perfect if they also do not contain free oxygen. This is not an accurate test of combustion efficiency in the kiln. It is merely a test of the amount of air admitted at the front end. It fails to show where, in the length of the kiln, combustion becomes complete and hence where, in the process of converting raw materials into clinker, the heat from combustion is made available.

(To be continued.)

Sand-Lime Brick Production and Shipments in July, 1934

THE following data are compiled from reports received direct from producers of sand-lime brick located in various parts of the United States and Canada. The accompanying statistics may be regarded as representative of the industry.

Nine sand-lime brick plants reported for the month of July, this being the same number as reported for the month of June, statistics for which were published in August:

Average Prices for July

Shipping Point	Plant Price	Delivered
Grand Rapids, Mich.....	\$.....	\$12.25
Mishawaka, Ind.	8.25	.....
Syracuse, N. Y.	16.00	20.00
Saginaw, Mich.	11.00	.....
Toronto, Ont., Can.	12.00	13.50

Statistics for June and July

	June	July
Production	†1,227,925	*1,219,425
Shipments (rail)	44,000	45,000
Shipments (truck)	964,592	847,775
Stocks on hand	1,434,381	1,351,180
Unfilled orders	425,000	155,000

†Nine plants reporting; incomplete, five not reporting unfilled orders.
*Nine plants reporting; incomplete, three not reporting unfilled orders.

Prices Bid—Contracts Let

Winston-Salem, N. C.: A second set of bids, sought by the city on its lime supply for the year 1934-35, was opened August 9. All eleven were identical and were the identical bids also that were submitted by the fourteen firms seeking the contract at an opening several weeks previously. The bids offered to supply the city with the 1500 tons of bulk lime at \$8.73 a ton and the 150 tons of chemical hydrate lime at \$10.98 a ton. Firms bidding were: North American Cement Corp., Baltimore, Md.; Longview-Saginaw Lime Works, Birmingham, Ala.; Southern States Lime Corp., Charleston, S. C.; Kimbalton Lime Co., Shawsville, Va.; Washington Building Lime Co., Baltimore, Md.; M. J. Grove Lime Co., Lime Kiln, Md.; Olive King Sand and Lime Co., Knoxville, Tenn.; Smith-Phillips Lumber Co., Winston-Salem (agents for Knoxville Sand and Lime Co.); Williams Lime Manufacturing Co., Knoxville, Tenn.; Consumers Coal Co., Winston-Salem, and Brown-Rogers-Dixson Co., Winston-Salem.

◆ ◆ ◆

Lincoln, Neb.: A bid of \$1.89 per cu. yd. on 303 cu. yd. of gravel to be unloaded on the highway between Neligh and Elgin, filed by Lewis & Schnick of Meadow Grove, was the lowest received by State Purchasing Agent Farris. The highest was \$2.15.

◆ ◆ ◆

Neenah, Wis.: Landwehr & Hackl Co., Seymour, Wis., low bidder on 1000 cu. yd. of street gravel at 69c per cu. yd.; Fountain Valley Stone Co., Fremont, bid 74c.

◆ ◆ ◆

Oxford Junction, Wis.: Local crusher selling agricultural limestone at \$1.50 per ton.

◆ ◆ ◆

Fort Peck Dam, Mont.: Becker County Sand and Gravel Co., Detroit Lakes, Minn., awarded contract for 2,000,000 cu. yd. of sand and gravel at \$1.31¼ per cu. yd.; to be produced near the dam site.

◆ ◆ ◆

Syracuse, N. Y.: Oscar R. Westfall low bidder on 200 cu. yd. of gravel, f. o. b. plant, at 20c per cu. yd., for FERA park project.

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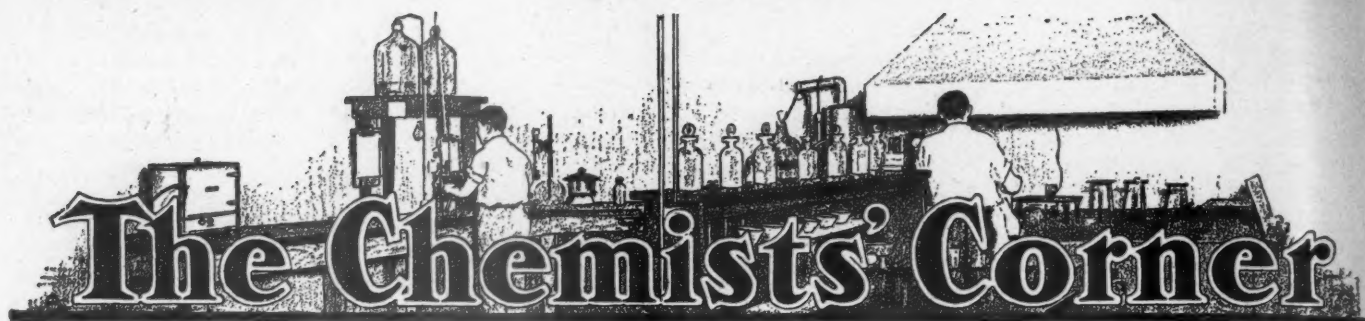
Butler, Ark.: Contract awarded Marquette Cement Manufacturing Co., Cape Girardeau, Mo., for 130,000 bbl. of cement at \$2.03½ per bbl., for Army Engineer revetment work.

◆ ◆ ◆

Omaha, Neb.: Peter Kiewit Sons Co. low bidder on 16,000 tons of gravel for county road work at \$1.02½ per ton.

◆ ◆ ◆

South Bend, Ind.: For track elevation project Consumers Co., Chicago, Ill., was low bidder on 25,000 to 45,000 tons of pit-run gravel at 45c per ton, from local pit; National Stone Co., Joliet, Ill., and Moulding Brownell Co., Chicago, low bidders on 10,000 to 18,000 tons of crushed stone ballast at 55c per ton.



Effect of the Granular Composition Upon Strength of Portland Cement

By K. Koyanagi,

Tokyo, Japan

ON the effect of the grain size composition or distribution upon strength quality of portland cement there are at present two opinions; some authors such as Helbig,¹ Rordam,² etc., assert that the finer the cement is ground, the better its strengths become, and the others such as Kühl,³ Eiger,⁴ Steiner,⁵ and others, insist that too fine grinding does not improve the strength quality of cement. Kühl splits a cement up into seven fractions, each fraction differing from the next in grain diameter by 10 microns. The individual fractions were tested for tensile and compressive strength of 1:3 mortar. His test reaches the results that a cement having grain size of about 30 microns have about the same strength as the original cement. By reducing the grain size to 15 to 20 microns the strength would be increased considerably above that of the original cement. To make the cement finer than 10 microns is not only uneconomical, but also would not improve the strength quality to any marked degree, according to Kühl.

The writer has ground two well sintered rotary kiln clinkers in a test mill, 40x45 cm., with the proper quantity of gypsum, using cylpebs as grinding media, for various lengths of time. In grinding special care was taken with regard to the size of grinding bodies and the proportion of cement and grinding media, so that no cement flakes were formed in the finished products. The cements thus obtained were tested for granular composition using sedimentation apparatus constructed by the writer.⁶ At the same time dry mortar of 1:3 mixture, compressive strength of wet mortar and concrete. The test pieces of wet mortar and concrete are as shown in Fig. 1. They were cylindrical in the cements were tested for the strengths of

TABLE 1—GRAIN SIZE ANALYSIS OF AGGREGATES
(Aggregates for concrete and wet mortar, tested with Taylor sieve)

For Concrete		For Wet Mortar	
Grain Size	Per Cent	Grain Size	Per Cent
3/4-in. to 3/8-in.	44.7		
3/8-in. to 4-mesh	22.2		
4-mesh to 8-mesh	11.0	4-mesh to 8-mesh	49.4
8-mesh to 14-mesh	5.5	8-mesh to 14-mesh	23.4
14-mesh to 28-mesh	6.0	14-mesh to 28-mesh	11.4
28-mesh to 48-mesh	6.9	28-mesh to 48-mesh	7.0
48-mesh to 100-mesh	3.7	48-mesh to 100-mesh	8.8
Fineness modulus	5.59	Fineness modulus	3.98

TABLE 2—(CEMENT No. 1)

Sample No.		1	2	3	4	5	6	7
Time of Grinding (Minutes)		15	20	30	40	50	60	90
Granular composition	Grain size >100μ	8.00%	2.80%	0.92%	0.28%	0.26%	0.24%	0.20%
	Grain size 100-55μ	20.63%	16.56%	11.21%	6.35%	4.44%	3.69%	2.59%
	Grain size 55-45μ	9.60%	9.43%	8.84%	7.57%	6.27%	5.68%	4.41%
	Grain size 45-35μ	10.99%	11.98%	12.17%	12.15%	10.92%	9.28%	8.51%
	Grain size 35-25μ	12.99%	14.37%	14.86%	15.50%	15.52%	15.92%	14.50%
	Grain size 25-15μ	15.16%	17.19%	18.50%	19.25%	19.85%	19.71%	18.95%
	Grain size <15μ	22.63%	27.67%	33.50%	38.90%	42.72%	45.48%	50.84%
Dry mortar strength	Tensile strength..... Kg/cm ²	3 days	33.0	38.0	38.7	42.7	45.7	50.8
		7 days	35.2	36.0	41.0	44.8	45.0	50.2
		28 days	41.0	43.3	45.2	48.2	47.7	47.2
	Comp. strength..... Kg/cm ²	3 days	335.7	373.0	441.3	476.0	500.7	534.0
		7 days	460.6	486.0	564.0	564.0	623.0	640.0
		28 days	512.0	546.0	596.0	600.0	686.0	708.0
Concrete strength	Slump test		20.0cm	20.3cm	19.5cm	20.0cm	20.0cm	18.8cm
		3 days	39.1	41.7	52.9	70.2	79.4	100.9
		7 days	77.9	93.6	114.9	146.6	153.7	200.4
	Tensile strength..... Kg/cm ²	28 days	214.8	199.5	243.8	281.2	254.7	300.7
		3 days	47.1	52.3	69.3	84.9	99.7	118.9
		7 days	107.6	119.5	164.0	184.2	209.1	258.8
Wet mortar strength	Slump test		19.0cm	22.0cm	21.0cm	22.0cm	21.5cm	21.0cm
		3 days	228.	235.	232.	232.	228.	223.
		7 days	47.1	52.3	69.3	84.9	99.7	118.9
	Comp. strength..... Kg/cm ²	28 days	251.0	287.2	326.5	362.3	370.0	384.5
		3 days	47.1	52.3	69.3	84.9	99.7	118.9
		7 days	107.6	119.5	164.0	184.2	209.1	258.8

form and of the sizes of 5x10 cm. and 15x30 cm. As aggregates for wet mortar and concrete, well washed river sand and gravel of such grading as shown in Table 1 were used.

It can be seen from these tables that the finer the cement is ground the better the strengths of concrete and wet mortar, while the compressive strength of dry mortar first increases, reaches its maximum at certain point, after which it becomes again a little lower.

If we now recalculate the granular compositions of cements and divide into three fractions: grains greater than 35 microns, grains

35 to 15 microns and grains smaller than 15 microns, and put the results into a triangular coördinate graph, we obtain Fig. 2.

The mixing proportion of cement and aggregates was 1:5.12 (1:1.74:3.38) for concrete and 1:3.67 for wet mortar. The water-cement ratio is 65 for both concrete and wet mortar.

The results of the tests are given in Table 2 and Table 3.

It can be seen in this graph that with prolonged time of grinding the grains greater than 35 microns decrease and grains smaller than 15 microns increase, while the amount

¹Helbig: *Zement*, 1931, No. 20, p. 75.

²Rordam: *ROCK PRODUCTS*, 1932, Vol. 35, No. 15.

³Kühl: *Zement*, 1931, No. 8.

⁴Eiger: *Tonind. Ztg.*, 1931, No. 55, and *Zement*, 1932, No. 24.

⁵Steiner: *Tonind. Ztg.*, 1932, No. 50.

⁶K. Koyanagi: *Cement and Cement Manufacture*, November, 1932.

of grains of medium size (15 to 35 microns) increase at first, reach a maximum at point No. 6 in cement No. 1 and at point No. 5 in cement No. 2. After these points the percentage of grains of medium size decreases again gradually. It is very interesting to see that just at these points, the compressive strength of dry mortar of both cements attains its maximum, as it is shown in Table 2 and Table 3. This fact coincides with the results of Kühl, who asserts that the grains of medium size are most effective in improving the strength of cement. Kühl tested the cement for the strength of 1:3 mortar.

From the results of these tests we can see that the strengths of concrete and of wet mortar increase with an increasing quantity of the finest flour in cement, while for dry mortar, in addition to the finest flour, a certain quantity of grains of medium size is necessary to attain the highest strength.

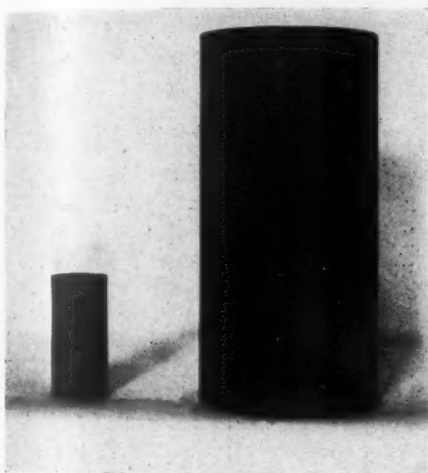


Fig. 1—Test pieces of wet mortar and concrete

As cement is mostly used as concrete or ferro-concrete, the true strength quality of cement is expressed by concrete strength, so we can say, "the finer the cement, the better its strength quality."

The results of these tests show also the unreliability of the present standard specification of testing cement using dry mortar of 1:3 mixture.

Fig. 2—Graph of granular composition

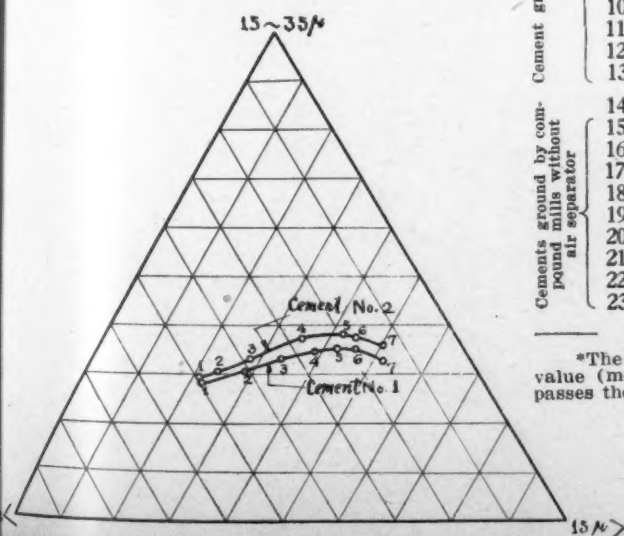


TABLE 3—(CEMENT No. 2)

Sample No.		1	2	3	4	5	6	7
Time of Grinding (Minutes)		14	16	20	30	45	60	90
Granular composition	Grain size >100μ	6.00%	4.00%	2.00%	0.16%	0.12%	0.10%	0.09%
	Grain size 100-55μ	20.32%	18.34%	13.52%	5.88%	2.88%	2.59%	1.95%
	Grain size 55-45μ	10.44%	10.70%	10.17%	7.98%	5.55%	5.02%	3.43%
	Grain size 45-35μ	12.45%	12.99%	12.88%	13.38%	11.08%	10.25%	7.91%
	Grain size 35-25μ	13.84%	14.20%	15.24%	17.35%	16.85%	15.93%	15.29%
	Grain size 25-15μ	15.60%	16.18%	18.21%	20.68%	21.72%	21.24%	21.71%
	Grain size <15μ	21.35%	23.59%	27.98%	34.57%	41.80%	44.87%	49.62%
Dry mortar strength	Tensile strength..... Kg/cm ²	3 days	25.6	26.5	33.5	36.3	39.5	48.3
		7 days	31.1	37.3	35.6	39.3	40.6	45.0
		28 days	38.3	43.5	40.0	47.2	47.0	50.8
	Comp. strength..... Kg/cm ²	3 days	307.3	315.0	395.3	448.0	539.6	586.6
		7 days	439.0	457.3	513.0	558.0	622.6	553.3
		28 days	567.0	584.0	630.0	684.0	732.0	614.0
Concrete strength	Slump test		19.3cm	18.5cm	18.3cm	18.8cm	18.5cm	17.8cm
	Comp. strength..... Kg/cm ²	3 days	25.5	32.3	42.8	50.9	82.6	90.6
		7 days	51.5	65.7	84.3	108.1	141.5	154.0
		28 days	119.1	151.1	199.5	201.8	240.4	266.5
	Comp. strength..... Kg/cm ²	3 days	59.9	70.9	....	104.5	118.0	112.3
		7 days	138.7	133.1	....	180.2	192.5	203.4
		28 days	306.9	289.5	....	362.3	379.3	393.3

Comparison of Granular Composition of Two Series of Cements Ground by Two Different Methods

By K. Koyanagi

IT IS GENERALLY believed that compound or compartment mills without air separators have the advantage; the compound mills grind the finest portion of cement even finer, while the use of an air separator, although it permits low sieve residue, produces a cement containing relatively little of the finest fractions.

In the August 27, 1932, issue of Rock PRODUCTS, the writer had an article on the

same subject and showed the above-mentioned general belief is to some extent correct. The fineness tests were conducted at that time by using standard sieves and Petersen's air analyzer. With these the amount of the finest flour (finer than 15 microns), which is most important for the concrete strength of cement, cannot be determined. In a recent experiment the fineness determination was carried out by using Kühl's sedimentation ap-

TABLE OF FINENESS TESTS OF VARIOUS COMMERCIAL CEMENTS
(Determinations were made at the room temperature of 26 deg. C.)

Cement No.	*Residue on the 4900m/cm ² Fraction I Fraction II Fraction III Fraction IV Finest flour					
	(grain size >100μ %)	(grain size 100-57μ %)	(grain size 57-33μ %)	(grain size 33-23μ %)	(grain size 23-16μ %)	(grain size <16μ %)
1	1.62	17.48	27.60	14.04	12.74	26.52
2	1.08	10.89	26.85	15.58	17.71	27.89
3	2.77	15.13	25.32	13.61	11.98	31.19
4	3.52	17.82	23.67	12.80	10.98	31.21
5	6.00	16.84	22.97	12.46	9.54	32.01
6	1.54	13.55	26.65	15.28	12.41	32.11
7	0.76	9.68	25.44	16.15	14.89	33.08
8	0.75	11.27	25.49	15.59	13.09	33.81
9	1.51	13.33	25.43	14.27	11.56	33.90
10	0.97	12.27	25.30	14.27	11.85	35.34
11	3.39	12.98	21.42	13.28	13.58	35.35
12	3.08	15.88	20.93	12.97	11.70	35.44
13	2.79	12.58	21.51	14.33	12.70	36.09
14	0.92	11.47	23.78	14.13	12.66	37.04
15	1.44	9.87	22.92	14.69	12.41	38.67
16	2.00	10.41	22.83	14.88	11.17	38.71
17	1.10	8.94	21.73	14.63	13.70	39.90
18	2.38	11.29	23.97	13.38	8.23	40.75
19	1.00	9.99	23.36	14.45	9.55	41.65
20	1.49	6.66	20.48	15.37	13.47	42.53
21	1.03	7.50	20.13	14.71	13.23	43.40
22	1.27	9.08	20.89	13.51	9.50	45.75
23	0.74	7.03	20.07	12.61	9.65	49.90

*The calculated value of the aperture of the sieve 4900-mesh/cm² is 88μ, but the real value (measured by microscope) is 75μ to 100μ, average 88μ, so the grain smaller than 100μ passes the sieve.

paratus as modified and adapted by writer.¹

The samples of cement were bought in the market, and the process used for grinding them was known. The results of the tests are given in Table 4.

Cement No. 1 to Cement No. 14 were made by grinding in mills with air separators, while No. 14 to No. 23 were made by grinding in compound-mills without separators.

The standard sieve test shows that both kinds of cement are of nearly the same fineness, but the latter series of cements contain far more of the finest flour than the former.

Portland Cement Yardage

AWARDS of concrete pavement for July, 1934, are announced by the Portland Cement Association as follows:

	Sq. yd. awarded during July, 1934	Sq. yd. awarded to date, July 28, 1934
Roads	2,093,483	18,958,497
Streets	852,226	8,602,229
Alleys	2,926	87,444
Total	2,948,635	22,648,170

Prices Bid—Contracts Let

Clinton, Ill.: C. L. Sword Co., Peoria, Ill., low bidder on county road gravel from local pits at 51c and 91c per cu. yd. for two projects.

Memphis, Tenn.: Benett Lime Quarries, Inc., Cincinnati, Ohio, low bidder on 5,000 yd. of riprap stone for use by the U. S. Engineers in bank protection work between Memphis and Barfield, Ark. The Cincinnati company bid was \$2.50 a cubic yard. The Federal Materials Co., Cape Girardeau, Mo, bid \$2.80, and the Waterways Stone Co., Princeton, Ky., bid \$3.15.

Fremont, Ohio: Contract to furnish stone to the city for the period ending December 31, 1934, was awarded to the Gottron Brothers Co. by the Fremont board of control. Bids were received from the Gottron company and the Swint Stone Co. The Swint company was low on the price of stone on the sizes they bid upon but their delivery charges were higher than the successful bidder. Gottron company offered to furnish Nos. 1, 2, 3, and 4 stone at 95c a ton at the quarry or \$1.25 delivered; Nos. 46 and 6 at \$1 a ton at the quarry or \$1.10 delivered and No. 6 rescreened for cold patch mix at \$1.20 at the quarry or \$1.50 delivered. The Swint company offered Nos. 1, 3, 4 and 7 stone at 90c a ton in the quarry and \$1.40 delivered in the city. Gottron company in its bid also mentioned that as the city plans to continue its own mix for cold patch work the company will install an additional shaker screen which will prepare the No. 6 stone suitable for cold patch work.

¹Cement and Cement Manufacture, November, 1932.

Conneaut, Ohio: Contract for 500 cu. yd. of 1- and 2-man rip-rap stone for park improvement let to White Rock Silica Co., Greenville, Penn., at \$2.75 per ton delivered; only other bidder, W. E. Thomson, Greenville, \$3.35 per ton.

Lime

New England Lime Co., Adams, Mass.: Federal Judge Brewster, Boston, Mass., has approved a financial reorganization of the company under the provisions of the new bankruptcy law.

Hagerstown Lime and Chemical Co., Marl, Md., has been sold to Harry T. Goetz and John W. Henneberger, Greencastle, Penn., and plant will be operated under the name of the National Lime Marl Works.

Dixie Lime Products Co., Ocala, Fla., has recently discovered a deposit of dolomitic limestone which it is proposed to develop for agricultural and other purposes.

Sand and Gravel

Iron City Sand and Gravel Co., Pittsburgh, Penn., has filed a petition with the local federal district court asking permission to effect a financial reorganization under the new bankruptcy act. The company is at present in receivership.

William J. McCormack Sand Co., New York City, has leased 4400 sq. ft. of wharf space of the city of New York for 5 years, at \$3025 per annum.

Ohio: Gravel used on county roads is only gravel, Attorney General John W. Bricker ruled. Land containing such deposits, he said, may be taxed only at a normal rate, and not at the higher rate imposed for mineral deposits. The auditor of Knox County had increased the valuation on one tract by \$10,000 on the claim that gravel is a mineral. Mr. Bricker held the increase invalid.

Morris County Sand and Gravel Co., Netcong, N. J., will be offered for sale by the federal court receivers on September 10.

Cooley Sand and Gravel Co., Chillicothe, Mo., is reported to be prospecting for sand and gravel in the vicinity of Fort Peck Dam, Mont.; it has a contract to supply 200 cars of ballast for a branch railway line in to the dam.

Independence Sand and Gravel Co., Independence, Ore., has been purchased by John R. Dickson, Portland, Ore., who has a contract to supply sand and gravel for the Coast highway bridge at Newport. A new plant will be built to supply 7 or 8 carloads daily for two years. G. C. Skinner is superintendent. The material will be dredged from the Willamette river. The Independ-

ence Sand and Gravel Co. plant was established many years ago; was successfully operated for a number of years after highway construction became a major business in the valley. It was closed after the old plant was declared to be unsafe for operation, with C. K. Spaulding Logging Co. holding the majority of the stock.

Gypsum

United States Gypsum Co., Chicago, Ill., has purchased the Star Roof Co., Los Angeles, Calif., to round out its national distribution of asphalt roofing.

At Greenville, Miss., the company is making improvements and additions to its wall-board plant to cost \$600,000.

Gypsum, Lime and Alabastine, Canada, Ltd., Montreal, Que., announces election of officers as follows: Henry Cockshutt, president and chairman; J. E. McConnell, W. C. Pitfield, vice-presidents; S. H. J. Reid, secretary; F. Andrews, general manager and treasurer; directors: R. E. Haire, J. R. Inksater, J. E. McConnell, Henry Cockshutt, W. C. Pitfield, W. T. Henderson, Geo. A. Dobbie.

Cement

North American Cement Corp., New York City, announces that E. S. Guth, who has for many years been district plant manager of the company, has recently been appointed general plant manager. Mr. Guth will have general supervision of all plants of the North American Cement Corp. He will continue to keep his headquarters at Hagerstown, Md.

Universal Atlas Cement Co., Chicago, Ill.: Acquirement of 1270 acres of limestone property near Rochester, Minn., by the former Atlas Portland Cement Co., during the boom period 1919 to 1929, for a possible cement plant, may turn out to be a serious liability if the present assessed valuation for tax purposes stays at the figure of \$640,000. The local taxing authorities increased the assessed valuation from \$60,000 in 1933 to \$640,000 in 1934. The company, quite naturally, has entered a vigorous protest.

Michigan State Cement Plant: Local politics may prevent junking the plant as the State Administrative Board decided was the businesslike thing to do (ROCK PRODUCTS, August, p. 61). The residents of Chelsea think the plant might furnish employment. It was formerly operated by convicts at a loss.

Oregon Portland Cement Co., Lime, Ore., is installing new equipment and relining kilns in anticipation of reopening its plant about September 1. The company has secured a contract for furnishing one-third of the cement requirements for the Bonneville dam on the Columbia river.

Rock Products News Briefs

Rock Phosphate

Tennessee: It is reported that TVA has at last recognized that few if any of their lessors are able to mine their rock phosphate with such terrific loss as is involved in their efforts up to date, and it is now arranging with one of the large mining companies having large unused capacity, to wash and recover the usable part of the phosphate deposits they have leased, on a service contract basis, pending the establishment by TVA of some recovery and drying plant of its own.

Of course, transportation of the run of mines material, even the short intrafield distances to one large central plant, will make prohibitive added costs on the product, which will enormously stretch the yardstick thus secured, or else will have to come out of the owner of the phosphate deposits, or the laborers mining the rock.

It is also reported, however, that in TVA's practical experience of the past year has shown what was very clear to operators on the ground back in 1919 and 1920, the last years in which any demand for phosphate existed, that if the widely scattered deposits of un-uniform grade, making up the vast proportion of the Tennessee phosphate deposits, were to be profitably utilized, a portable plant must be developed, probably in a large number of small units, and TVA is said to be at work designing such a plant for nearby experiment.

A plant of that kind was designed in 1920, but never constructed for the reason that never since that time has there been demand for it on the part of those who had the money to build one. The plant in question consisted of a small dragline outfit, power pump, nozzles, pugmill, revolving washer cylinder, cone classifiers, Oliver filters, Lowden dryer, and incidental apparatus, all mounted on flat cars. Such an outfit with 20 to 30 tons per day capacity would probably cost in the neighborhood of \$15,000, and would, of course, employ trucks instead of building railroad tracks. The overburden and washer waste would be put back in place behind the mining, and the land after mining would be as good or better than before.

A multiplicity of such small plants would cost far less than one big central plant, and would lend itself admirably to Dr. Morgan's central thought of permeating industry through agriculture, to the great benefit of the entire phosphate field, both industrially and agriculturally.

American Agricultural Chemical Co., New York City, acquired about 1½ acres on waterfront at South Amboy, N. J., as site for a new plant for the production of phosphate specialties under a special process, with machine shop and other mechanical departments. Electric furnaces and auxil-

iary equipment will be used for manufacture. The cost will be about \$300,000 with machinery. Dr. R. L. Sebastian is chief chemical engineer in charge.

Silica

Minnesota Mining and Manufacturing Co., Wausau, Wis., has completed construction of a new roofing granule plant that is said to be the last word in such operations, representing an investment of something like \$300,000. According to L. A. Hatch, local manager: "The plant is interesting to the technical men of the quartz industry in that all the new equipment has been designed especially for it. No other plant has the same kind of equipment. The crusher rolls being installed are the first of their type ever built and will be known as the 3-M Wausau type. The second and larger drying kiln and cooler will give an added capacity of finished color-quartz of approximately 80,000 tons annually.

"The crushing, grading and drying have previously produced an excessive amount of dust. In the new plant there is being installed an electric dust precipitator which will collect better than ninety-eight per cent of all dust produced in all the operations. This machine, the Cottrell precipitator, was selected because of its efficiency and ability to operate under all conditions," he said.

Mr. Hatch says that when the plant is completed and in full operation, including the quarry, the annual pay roll will be in excess of \$300,000.

The company recently awarded to Foley Brothers of St. Paul the contract for blasting quartz in the company quarry on Rib Mountain and hauling it to the crushing plant.

All machinery for the new unit is equipped with Timken bearings and controlled in an automatic electrical panel on the first floor of the new structure. The new addition to the color quartz unit has the largest anti-friction mixer of its kind ever built. It was made by the T. L. Smith Co., Milwaukee. It is capable of mixing 60 cu. ft. of quartz at a single time. This mixer is about six times the size of the one in use at present.

The plant crushes quartzite into granules and mixes it with a green coloring matter which research engineers of the company developed. The pigment retains its color and does not fade, making it valuable for outdoor use. The company plans to manufacture quartz of various colors by next year, following continued research by its own chemical engineers, according to Mr. Hatch.

Although the production at Wausau is on a large scale it represents but a small percentage of the total business of the Minnesota Mining and Manufacturing Co. which has headquarters in St. Paul, Minn., where

the manufacturing of sandpaper is one of its major businesses.

Vermiculite

National Vermiculite Products Corp., Chicago, Ill., has acquired the property and assets of the Vermiculite and Asbestos Co., Libby, Mont. According to local newspaper reports, the officers of the corporation are: A. T. Kearney, president; W. J. Mohr, vice-president; Lester Armour, treasurer; C. D. Sells, secretary, all of Chicago. Also associated with these men in the active development of this new industry is J. N. Camden, of Kentucky, who is a heavy stockholder and has been active in the preliminary work of its organization. The new owners have already begun enlarging the plant at the mine. This work is in charge of O. A. Labus, an engineer with much experience in designing mining machinery and mills, and P. E. Oscarson, mining engineer, who will be in charge of production at the mine after the improvements at the mill are completed. These men and associates have been engaged during the past year or two in developing a number of products largely composed of vermiculite and now their corporation, the National Vermiculite Products Corp., is getting in position to market these products in a large way. About \$40,000 worth of new machinery is being installed at the mine and mill and about 25 men are employed in operating the property and in making the new improvements. Production is being kept under way while the new equipment is being installed.

Cement Products

Fischer Brothers, Shakopee, Minn., have installed equipment to make highway concrete culvert pipe 15 to 24 in. in diameter.

Mixed Concrete Co., Columbus, Ohio, has added another 2½-cu. yd. Jaeger truck mixer to its fleet. The company now operates five mixer trucks.

Lee J. Conrad, Midland, Mich., has bought the concrete block business of Elroy S. Sias.

Bremerton Concrete and Pipe Co., Bremerton, Wash., has installed a new plant to make concrete pipe and other products. The firm consists of P. P. Sharick and H. C. Baker. Mr. Sharick comes to Bremerton from Shelton, where he has lived for several years operating a similar business under his own name. Mr. Baker comes from Seattle where he has been serving in the capacity of superintendent for the Concrete Pipe Co. for a number of years. They will make concrete pipe from 3 in. to 36 in.; also many articles for the building trade and home owner.

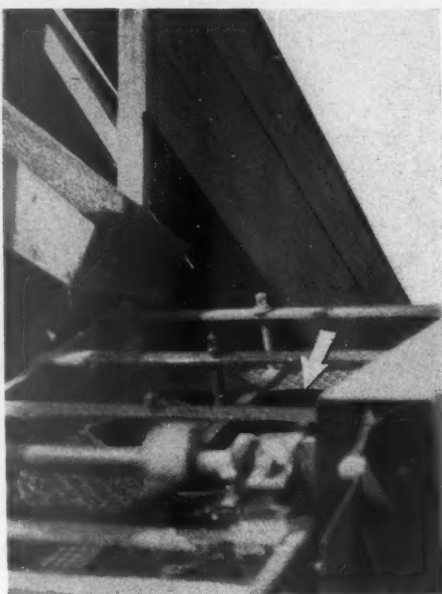


Hints and Helps for Superintendents

To Save Screen Wear

DESPITE USE OF abrasion-resisting materials in construction of modern screens, the large, sharp gravel grades make cost of screen renewal heavy in many plants. The simple arrangement of a steel and rubber mat, as shown in the accompanying illustration, helps to hold down this expense item. A screen feeding arrangement was not possible, in the case of the installation shown, without extending the present platform, 30 feet above ground level.

The rubber section of the mat is bolted through the light steel plate on to the screen in the spot where most of the heavy material falls from the spout. It thus bears the brunt of punishment from large gravel pieces that travel with considerable velocity from the spout to the screen area. If properly placed, the mat will not affect capacity of the screen to any marked degree.



Metal and hard rubber mat for gravel screen protection

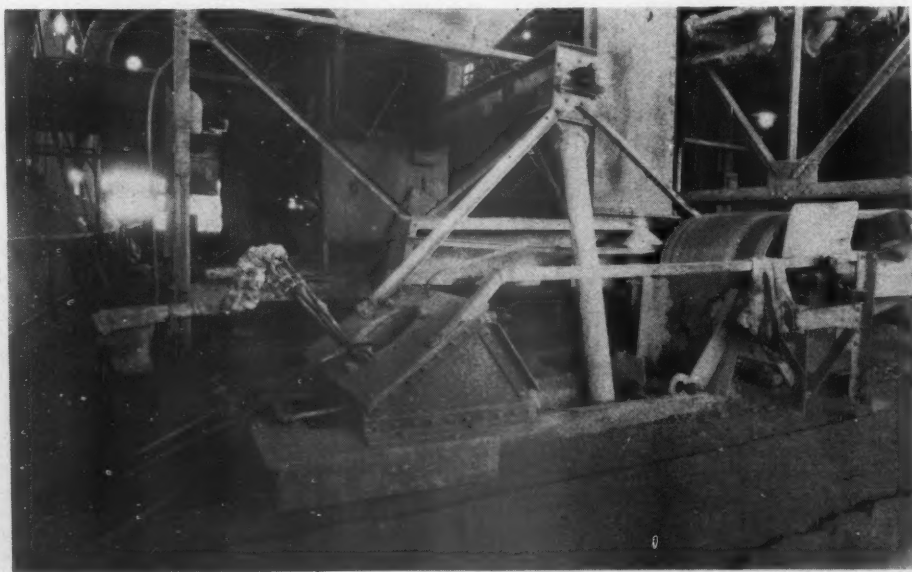
Simple Kiln Feed for Cement Filter Slurry Cake

SOME difficulty is experienced at nearly all cement plants which use slurry filters in feeding the dewatered slurry to the kiln. The standard method is by means of an inclined screw, but as the lower end of the screw is exposed to high heat, difficulty is frequently met with in maintaining the bearings.

At the Davenport plant of the Dewey Portland Cement Co. this difficulty has been solved in an ingenious way. The screw feeder has been removed entirely and two

compressed air jets and one steam jet substituted for it. The upper end of the feed trough, or spout, is open, as shown in the accompanying view. Just about enough air pressure is maintained to overcome the draft of the kiln, for the spout opens directly into the kiln and the dust and flame from the kiln would shoot out, but for the air jets.

One air jet is also a poke rod for keeping the passage clear when the slurry cake shows any tendency to accumulate. The steam jet facilitates the sliding of the slurry



Air and steam jets replacing screw feeder for slurry

down the chute, saturated or wet steam being used, the purpose being merely to lubricate the chute. The combination constitutes a successful gravity feed, requiring no maintenance and very little attention.

Theoretically, of course, the introduction of cold air at the end of the kiln cools the kiln gases, and might be conceived to create some back pressure in the kiln. Actually, however, so little air is required that there is no appreciable effect. This plant has waste-heat boilers, so any effect would be quickly noticed. Incidentally, this is probably the only cement plant in the world where one may look down directly into the feed end of a cement kiln in action—and with no discomfort.

Equipment for Temporary Storage

FOR temporary storage requirements of products a device described in *Coal Age* is practical and is said to make that storage possible at low cost. This system gives both low first cost and low operating cost, it is said.

In a case where it was used for storing slack coal space was available for storage 400 ft. from the rescreen plant from which the slack was to be transported to the stockpile and to which it was to be returned for loading. After a careful survey of various methods a reversible belt conveyor was installed between the rescreen plant and the storage yard. A scraper which previously had been purchased for use underground was put in service in the yard for piling and reclaiming the coal.

Conveyor specifications were as follows: Width, 18 in.; length, 400 ft. 8 in. from center to center of pulleys; speed, 350 ft. per min.; capacity, 90 tons per hr. storing and 50 tons per hr. reclaiming; belt construction, 4-ply, 28-oz. duck with 1/16-in. rubber cover. Rise from the bin at the rescreen plant to the discharge point is 16 ft. The belt is driven through two sets of spur gears by a 15-hp., Type FT, normal-torque, low-starting current, 860-r.p.m. General Electric motor, and is carried on Link-Belt Type 55 ball-bearing idlers on unit stands.

Coal discharged from the end of the conveyor falls to a pile from which the scraper, pulled by a Sullivan hoist, distributes it to the storage pile. In reclaiming the coal, the scraper is reversed to bring the coal to the boot of a 14x7-in. Link-Belt centrifugal-discharge elevator, which feeds onto the belt conveyor. The elevator is driven from the

belt conveyor headshaft through a detachable chain, which is removed when storing coal. The reclaimed coal travels on the reversed belt to a point under the rescreen plant, where it discharges over the foot pulley into the railroad car.

The 15-hp. motor has proved to be ample for the duty of bringing the coal up grade to the storage pile and for operating the elevator and belt in reclaiming. In estimating the installation, plain grease-cup lubricated idlers were considered to keep down the initial cost. It was found, however, that these idlers would be much more expensive in the long run, inasmuch as the increased friction would necessitate a 20- instead of a 15-hp. motor, and would require heavier driving equipment and 5-ply, 32-oz. belt.

When stocking coal, only one man, who operates the scraper hoist, is required. Three men are used in reclamation, as follows: Hoistman, shoveler at the elevator boot and a car dropper at the loading point. In the autumn of 1930, 2200 tons was stored and reclaimed the following spring; in the autumn of 1931, the total ran up to 6375 tons, likewise reclaimed the following spring. Estimated cost of storing slack is 5 c. per ton; reclamation cost is 12 c. per ton. These figures include labor, material, power and maintenance, but not interest and depreciation. Total investment in storage equipment, including conveyor and structures, and the scraper and hoist, did not exceed \$8000.

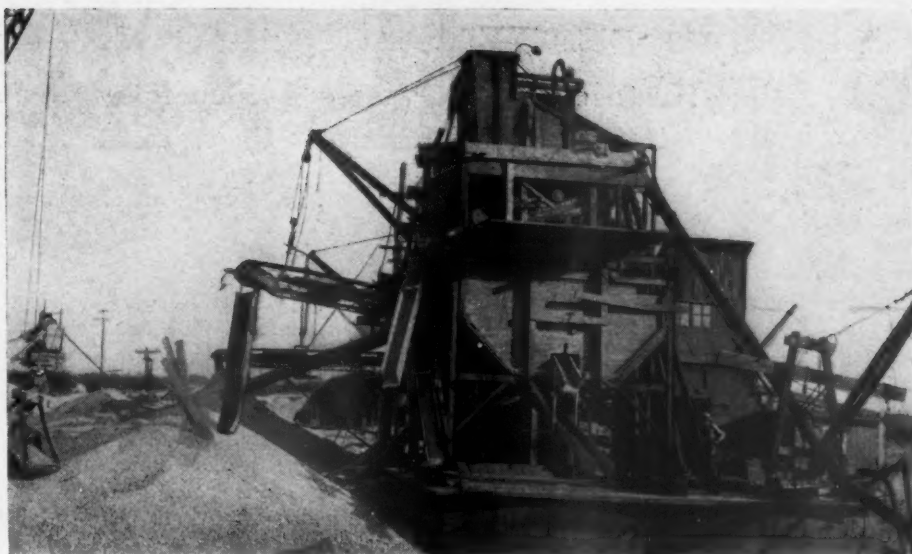
Gravel Plant on Pontoons But Does Not Float

THE SCREENING and washing plant of the O'Donnell Sand and Gravel Co., Vincennes, Ind., has unique foundations. This is a dredging operation but the sand is removed from a pit instead of from the river bottom. The dredge is equipped with a 10-in. Amsco pump driven by a Venn Severin Diesel engine.

The plant rests on a pair of steel tanks or pontoons instead of on a permanent foundation, so that it actually can be floated around the pit when it is desirable to move it. In operation, however, the pontoons are partially filled with water and rest firmly on the shallow gravel bottom of the pit.

The pump discharges to a large box at the top of the plant from which the material passes down over stationary screens under wash water jets for sizing and washing. A double-deck Simplicity vibrator has been installed and this is used for final sizing of the material. The sized material falls to small bins beneath the screens or else is taken directly to the adjacent shore and stockpiled by means of movable belt conveyors from the plant.

When it is necessary to remove this material to points further from the plant to make room for more gravel from the plant, the work is done by a Lima 101 shovel crane



Gravel plant on pontoon "foundation"

equipped with a clam-shell bucket. This clam-shell is also used for loading to trucks.

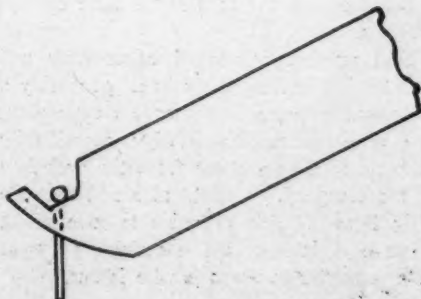
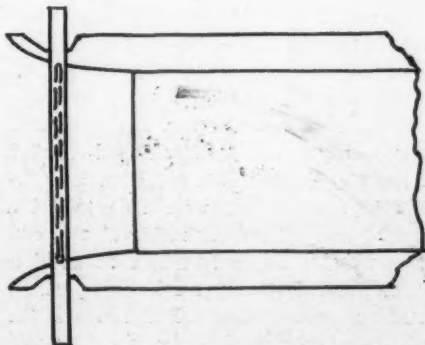
"Timing Rotation of Detonation With Cordeau"

By R. D. Beatty,
Dolcito Quarry Co., Birmingham, Ala.

AN INTERESTING departure from the conventional Cordeau "hook-up" was made recently on a well drill shot at Dolcito Quarry, Birmingham, Ala. In former shots at this quarry considerable difficulty had been experienced with a "toe" and it was believed that this "toe" was caused by the fact that there is sufficient lag in time between the firing of the top and bottom of a deep well hole, where the first detonation takes place at the top of the hole, for a large part of the bottom charge to be dis-

sipated. In order to overcome this lag in time, electric blasting caps were placed in the bottom of each hole in contact with the Cordeau.

A special Cordeau manufactured by the Ensign-Bickford Co. was used, having a pair of waterproofed wires running underneath the counter. Plain Cordeau was used for a surface line as a precaution against misfires and an electric blasting cap was placed on the end of this surface line. Due to the difference in the speed of electricity and the detonation rate of Cordeau, the detonation of this shot occurred first in the bottoms of the holes. The bottom was pulled out clean and there was no "toe" left. There were 18 holes in a double row, the back row averaging 32 ft. back from the face and 120 ft. depth; 18,500 lb. of gelatin dynamite, deck loaded, blasted down approximately 90,000 tons of dolomite.



Top and side views of deflector

Baffle for Better Distribution in Bins

AN EASILY MADE deflector to keep material from striking the side of the bin when discharged from a chute is shown in the accompanying drawing. It consists of a flat metal plate nearly as long as the chute is wide, with one of its long edges welded to a rod somewhat longer than the plate. The rod is placed in notches cut in the top edge of the chute as near as possible to the lower end. The lower portion of the chute at this point is cut away somewhat to permit the plate attached to the rod to swing freely. The notches are made with the welding outfit and also the portion of the chute which is cut away is removed by the same means.

In operation the material coming down the chute strikes the baffle and falls directly downward. The swinging deflector has several advantages over a stationary one. The distribution in the bin is better with this type, and it will last longer as it does not receive the wear that a rigid one does.

Planned Safety Campaign in Aggregates Plants

How Accident Prevention Is Supervised at Several Sand and Gravel and Crushed Stone Plants of Gifford-Hill & Co., Inc.

By E. P. Golding

G IFFORD-HILL & CO., INC., Dallas, Tex., in normal times operates 11 sand and gravel and quarry plants in Texas and Louisiana. The type of these operations are varied. We have river dredge operation, lake dredge operation, dry bank and one rock quarry. While the ideas and methods we employ are not new nor novel, they have been the means of bringing about a 45% reduction in the number of personal injuries.

I want to say in the beginning that this reduction is entirely attributable to the active direction of the executives, along with the whole-hearted coöperation of the officers, supervisors and men, without which an accident prevention campaign is useless.

Our safety activities can be captioned under three heads: (1) Education, (2) Engineering and (3) Enforcement. In taking up the first head it might be well to mention that we do not emphasize the slogan "Safety First." There is perhaps no other slogan in the English language that creates more derision in the mind of the average American. What we do try to emphasize in all of our educational schemes is that a person who stays "Accident Conscious," when exposed to danger is doing the intelligent thing rather than showing fear.

Education

Another point in our educational program is that we try and keep as many "Don'ts" out of it as possible. With the thought in mind that after all we are grown up children, and we have never forgotten our dislike for this particular word. We do try to point out errors of judgment and their results, which naturally has an appeal to one's reason. However, the one to whom it does not appeal, is handled by the supervisor, which we will not deal with here but later on under the head of Enforcement.

Visual and word of mouth methods of education are used consistently in all of our plants and operations. Safety meetings at which the rank and file are allowed to express themselves are held periodically. The superintendent of the plant is in charge of these meetings, and they are held 15 minutes on the time of the company and 15 minutes on the time of the men. Unsafe practices are discussed. Suggestions are encouraged with recognition given to all ideas; the good ones adopted where practical and an explanation given for the ones that are not adopted. In this way we hope to maintain interest.

It has been our experience that where an impracticable idea has been advanced, it is much better to explain why it is impracticable than to ignore it. The man who makes an

impracticable suggestion today may, if he isn't discouraged, make another one some time that is valuable. We are trying to establish a practice and have been very successful at it, of getting employees to "suggest caution" to each other when involved in some dangerous work. Not in any sense of showing superior intelligence, but in the spirit of good fellowship, knowing full well that we all err at some time or another; and if we watch each other it decreases the possibility of man-failure. We are not practicing this to a degree where it might breed "over-cautiousness," but in a sensible way.

Our methods of visual education are through the medium of bulletin boards, warning signs, stenciling accident prevention propaganda on dangerous equipment, etc. We supplement our National Safety Council posters with posters made by Roney Raymond and Fred Newcomer, both employees in our general office. These home-made posters have a great deal more interest to the men than the lithographed ones.

We analyze our accident records and pick out the class of accidents that stand out, and have one of our artists depict it on stencil paper which we mimeograph and post on bulletin boards around shops and on equipment. We do not criticize in these posters, but try and make them humorous, yet tell the story.

Another means of visual education which we have employed to an advantage is the 16 mm. moving picture film. We made 1500 ft. in one year at a cost of \$90, including in it the pictures of most all of our employees at the different operations. We ran a safety scheme showing safe and unsafe practices, importance of first aid, fuel and lubrication items, conservation of material and supplies, all the way through, but not enough to become boring. We were able to get a scene of how one of our most valuable employees was badly injured with the man himself on crutches taking the leading part.

Another means of visual education is the *Safe Worker* published by the National Safety Council. These booklets are distributed among the men at the different operations.

Still another means of stimulating and maintaining interest is by issuing monthly a statement showing the progress each plant or operation is making. This is occasionally supplemented by a letter from the president of the company. I might also add that the "Big Boss" is just as quick to give credit to an organization that is making progress as a reminder to the one who is not.

We have in effect a safety contest. This

contest is between the plants in Texas and the plants in Louisiana. Better known as the Longhorns and the Pelicans. Injuries are weighed according to their severity by a debit system on a man-hour basis, thereby insuring a fair and impartial system of deciding the winner.

Engineering

Engineering: Coming under this head is the erection and maintenance of plants, guarding of machinery, maintaining safe walkways, railings, underfoot conditions which also include housekeeping in and around property.

While injuries from unsafe conditions are in the minority, our chief engineer is always incorporation safety features in new construction, making them as "fool-proof" as possible. Electric wires are placed in conduit wherever they might create a hazard. We might say here that in the eighteen months he and the plant superintendents erected six new plants, dismantled four old ones, built probably eight miles of standard and narrow gauge railroad, without a serious injury. Considering the fact that they were all "time order jobs" we consider this quite an achievement.

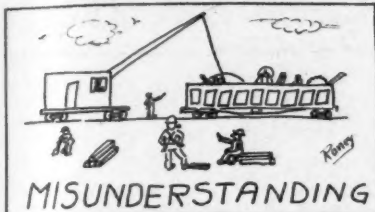
Another feature coming under Engineering which I want to mention is the relationship of the purchasing agent to the safety problem. We are glad to say that in our company the purchasing agent is constantly on the alert to the part he plays in accident prevention.

Enforcement

Last, but not least, comes Enforcement. This feature of the accident program covers the enforcement of safe practices outlined by the president and officers. Employment of new men, which includes an investigation of character and physical condition, disposition of accident-prone employees, investigation of accidents and their causes, disposition of malingers, disposition of the habitual chance taker, disposition of the careless and indifferent, close contact with medical staff, and close contact with claim department.

Illustrations on opposite page are reproductions of safety posters made by employees of Gifford-Hill & Co., Inc., Dallas, Texas. Mounted on plant bulletin boards, the "home-made" posters attract greater attention, it is said, than the elaborate, lithographed posters commonly used in industry.

GIFFORD-HILL & COMPANY INC., SAFETY DEPT.



It is an old saying that the majority of the trouble in the world is due to the lack of understanding.

An accident recently occurred at one of our plants, the details of which are as follows:—

The moving crew was unloading a Monaghan 5-7 from a SPANGLER between the employee, whose duty was to hook the line on the material being unloaded, and the operator of the crane, resulting in half of the line of the Monaghan catching the employee between the rail part and the side of the car or other machinery. Fortunately he escaped with only a bruised leg. Can you imagine how he felt when he realized the time of steel about to crush him.

The Lesson we obtained from this accident further emphasized the importance of perfect team work in handling materials at all times.

Signals to crane men in handling such work as this should only be given by one man, and by the man that is exposed to being injured.

(UNDER CRANES AND OTHER ACCIDENTS)-----WE CAN DO IT!

GIFFORD-HILL & COMPANY INC., SAFETY DEPT.



WHAT'S WRONG IN THIS PICTURE

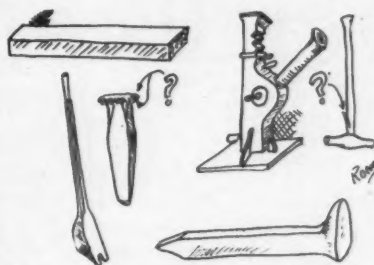
An accident report received in May reads:

"EMPLOYEE WAS CUTTING ALIVES WITH AN ADJUSTABLE SCISSOR AND FINGER OF LEFT HAND NEEDED HIS RIGHT EYE."



SAVE 'EM.

GIFFORD-HILL & Co. Inc. SAFETY DEPT



86% or more than 1/4 of the total injuries in Gifford-Hill & Co., Inc. plants in 1930

COULD BE PREVENTED BY THE FOLLOWING:

1. **WORKING** and **DRIVING** RAILS **DOWN** and **UP**

2. **WORKING** and **DRIVING** RAILS **DOWN** and **UP**

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GIFFORD-HILL & COMPANY, INC. SAFETY DEPT.



THE ELECTRIC AND IS ALSO IN ULTRA-VIOLET AND INFRARED RAYS; SOME OF WHICH ARE ANNOYING AND DANGEROUS TO VISION.

SEVEN GIFFORD-HILL EMPLOYEES HAVE HAD TO SEEK MEDICAL ATTENTION IN THE LAST FOURTEEN MONTHS, ACCOUNT OF WATCHING OR GLANCING AT ELECTRIC WELDING IN OPERATION.

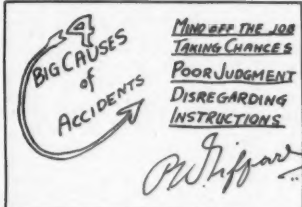
ELECTRIC WELDING SHOULD COVER UP EYES WITH PRACTICABLE

SAFETY AND EYES AGAINST HARMFUL LIGHT ENCOUNTERED IN WELDING OPERATIONS.

Accidents All Luck?

You're Wrong ASK THE MEN WHO HAVE NONE

Thoughtful Workmen Seldom Get Hurt



Here are the pictures, BUT read the Story



GIFFORD-HILL & COMPANY INC. SAFETY DEPT.



An accident report was recently received in the Dallas Office reading as follows:

"WHEN THE LOADING CARS AT NIGHT UNDER PLANTS; THIS MAN WAS ON CAR BEING LOADED WITH GRATE. MAN OF SAND CAR CALLED HIM TO RELEASE GRATES, CAR WAS ON ONE AND MAN SLIPPED FALLING TO GROUND, SPRAINING ANKLE."

ITS UP TO ALL OF US TO WATCH OUR STEP!

GIFFORD-HILL & COMPANY INC.



A PROTECTING nail point is like a snake in the grass. It may injure you when you least expect it. It is part of every safe worker's job to pick up all loose nails and to remove or turn down all projecting ones.

DID YOU KNOW THAT—

14 Gifford-Hill & Company employees were injured in 1930 by stepping on N-4-1-1-3

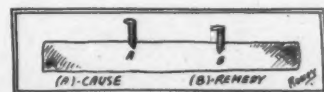


GIFFORD-HILL & COMPANY, INC. SAFETY DEPT.

One of a series of accident prevention posters illustrating accidents that have occurred in this company. Their causes and prevention being suggested by practical men.

FLYING - SPIKES

CAUSED INJURY TO 12 EMPLOYEES OF GIFFORD-HILL INJURED THE LAST 18 MONTHS:



The following remedy suggested by Superintendent F. E. White

Flying spikes are caused by spikes being improperly SET. Trackmen should SET spikes by tapping same until wedge portion of spike is completely imbedded in tie. Set until then should heavy blows be struck. Round headed spike omble should never be used. Spike should always be SET perpendicular. Spikes are most likely to fly when being driven in UNDER - DRUGGOTS - or - WEE ties.

"ACCIDENTS DO NOT HAPPEN, THEY ARE CAUSAL."



Recent Quotations on Rock Products Securities

Stock	Date	Bid	Asked	Dividend	Stock	Date	Bid	Asked	Dividend
Allentown P. C., com. ⁴⁷	8-22-34	4	6		McCready-Rodgers, com. ⁴⁷	8-22-34	5	7	
Allentown P. C., pfd. ⁴⁷	8-22-34	5	7		McCready-Rodgers, 7% pfd. ⁴⁷	8-22-34	10	20	
Alpha P. C., com.	8-22-34	14 1/4	14 1/2		Medusa P. C., com. ⁴⁷	8-22-34	10	12	
Alpha P. C., pfd. ⁴⁷	8-22-34	80	85	1.75 qu. Sept. 15, '34	Medusa P. C., pfd. ⁴⁷	8-22-34	50	55	
Amalgamated Phos. 6's, 1936 ⁴⁷	8-24-34	100	102		Michigan L. and C., com. ⁴⁷	8-22-34	60	65	
American Aggregates, com. ⁴⁸	8-23-34	1/4	1 1/4		Missouri P. C., com. ⁴⁷	7-26-34	6	...	
American Aggregates, pfd. ⁴⁸	8-23-34	1/2	1 1/4		Mosarch Cement, com. ⁴⁷	8-24-34	90	100	
American Aggregates, 6's 1st mtg. 3/6's, 1943 new bonds ⁴⁸	8-23-34	45	...		Monolith P. C., com. ⁴⁷	8-16-34	2	3	
American Aggregates, 6's 1943, old bonds ⁴⁸	8-23-34	45	...		Monolith P. C., 8% pfd. ⁴⁷	8-23-34	5	6	
American L. & S., 1st 7's ⁴⁸	8-23-34	88	...		Monolith P. C., units ⁴⁷	8-22-34	15	20	
Arundel Corp., com. ⁴⁸	8-23-34	13	16		Monolith P. C., 1st Mtg. 6's ⁴⁸	7-13-34	85	90	
					Monolith Portland, Midwest. pfd. ⁹	8-23-34	1/4	1 1/4	
Bessemer L. and C., Class A ⁴⁹	8-23-34	2 1/2	3 1/2		National Cem. (Can.) 1st 7's ⁴²	8-22-34	76	...	
Bessemer L. and C., 1st 6 1/2's, 1947 ⁴⁹	8-23-34	30F	...		National Gypsum A., com.	6-25-34	9 1/4	10 1/4	
Bessemer L. and C., cert. of dep., 1947 ⁴⁹	8-27-34	29	32		National Gypsum, pfd.	7-26-34	86	88	
Bloomington Limestone, 6's ⁴⁷	8-22-34	10	12		National Gypsum 6's ⁴⁷	8-22-34	95	100	
Boston S. and G., new com. ⁴⁷	8-23-34	1	3		National L. and S. 6 1/2's, 1941 ⁴⁷	8-22-34	85	90	
Boston S. and G., new 7% pfd. ⁴⁷	8-23-34	5	10		Nazareth Cement, com. ⁴⁷	8-22-34	5	7	
Boston S. and G., 7's, 1934 ⁴⁷	8-23-34	60	...		Nazareth Cement, pfd. ⁴⁷	8-22-34	30	35	
					Newaygo P. C., 1st 6 1/2's, '38 ⁴⁶	8-27-34	50	...	
California Art Tile, A ⁵⁰	8-23-34	1	2 1/2		New England Lime 6's, 1935 ⁴⁴	8-22-34	6	10	
California Art Tile, B ⁵⁰	8-23-34	no bid	...		N. Y. Trap Rock 1st 6's, 1946 ⁴⁶	8-27-34	70	...	
Calaveras Cement, com.	7-21-34	1/4	1 1/4		N. Y. Trap Rock, 7% pfd. ⁴⁸	8-23-34	OW	...	
Calaveras Cement, 7% pfd.	4-12-34	47 1/2	75		North Amer. Cement, 1st 6 1/2's ⁴⁷	8-22-34	10	13	
Canada Cement, com.	8-20-34	6 1/2	actual sale		North Amer. Cement, com. ⁴⁷	8-22-34	1/2	1	
Canada Cement, pfd.	8-20-34	38	actual sale		North Amer. Cement, 7% pfd. ⁴⁷	8-22-34	2	3	
Canada Cement, 6 1/2's, 1947	8-21-34	94 1/2	96 1/2		North Shore Mat. 1st 6's ⁴⁷	8-22-34	30	35	
Canada Crushed Stone, bonds ⁴²	8-22-34	74	78		Northwestern States P. C.	7-26-34	13 1/2	14 1/2	
Canada Crushed Stone, com. ⁴²	8-22-34	5	nominal not listed		Northwestern Port. Cem., units ⁹	8-23-34	39	43	
Certainite Products, com.	8-23-34	6 1/4	6 1/2						
Certainite Products, pfd.	8-23-34	23	22		Ohio River S. and G., com.	7-23-34	...	5	
Certainite Products, 5 1/2's, 1948	8-21-34	62 1/2	actual sale		Ohio River S. and G., 1st pfd.	7-23-34	28 1/2	...	
Cleveland Quarries	8-22-34	20	22		Ohio River S. and G., 2nd pfd.	7-23-34	5	10	
Consol. Cement, 1st 6 1/2's, 1941 ⁴⁷	8-22-34	1	2		Ohio River S. and G., 6's ⁴⁶	8-27-34	6	8	
Consol. Cement, pfd. ⁴⁷	8-22-34	1	2		Oregon P. C., com. ⁴⁷	8-22-34	5	10	
Consol. Oka S. and G. (Can.), 6 1/2's ⁴²	6-23-34	22	25 nominal		Oregon P. C., pfd. ⁴⁷	8-22-34	40	50	
Consol. Rock Prod., com. ⁴⁷	8-22-34	1	2						
Consol. Rock Prod., pfd. ⁴⁷	8-22-34	2	3		Pacific Coast Aggr., com. ⁴⁰	8-23-34	...	2c	
Consol. Rock Prod., units ⁴⁷	8-22-34	3	5		Pacific Coast Aggr., pfd. ⁴⁰	8-23-34	...	5c	
Construction Mat., com. ⁴⁷	8-22-34	1	2		Pacific Coast Aggr., 6 1/2's, '44 ⁴⁰	8-23-34	16F	18F	
Construction Mat., pfd. ⁴⁷	8-22-34	2	4		Pacific Coast Aggr., 7's, 1939 ⁴⁰	8-23-34	2F	4F	
Consumers Rock & Gravel, 1st mtg. 6 1/2's, 1948 ⁴⁷	8-22-34	27	30		Pacific Coast Cement, 6's, 1937 ⁴⁰	8-23-34	43	46	
Coosa P. C., 1st 6's ⁴⁷	8-22-34	15	20		Pacific P. O., com. ⁴⁰	8-23-34	2 1/2	3 1/2	
Coplay Cement Mfg., pfd. ⁴⁷	8-22-34	7	10		Pacific P. C., pfd. ⁴⁰	7-10-34	34	38	
Coplay Cement Mfg., 6's, 1941 ⁴⁷	8-24-34	53	57		Pacific P. C., 6's, 1935 ⁴⁰	8-23-34	100	...	
					Pacific P. C., 6 1/2's, pfd. ⁴⁰	8-23-34	33	35	
Dewey P. C., com. ⁴⁷	8-22-34	100	125		Peerless Cement, com. ⁴⁷	8-22-34	...	1 1/2	
Dolese and Shepard	7-26-34	10 1/2	11 1/2		Peerless Cement, pfd. ⁴⁷	8-22-34	...	2	
Dufferin Pav. and Cr. Stone, com.	7-16-34	2	actual sale		Penn. Dixie Cement, com.	8-23-34	4 1/4	4 1/2	
Dufferin Pav. and Cr. Stone, pfd.	7-16-34	20	actual sale		Penn. Dixie Cement, pfd.	7-26-34	14	19	
					Penn. Dixie Cement, 6's A, 1941	8-22-34	66	actual sale	
Edison P. C., com. ⁴⁷	8-22-34	1	2		Penn. Glass Sand Corp., pfd. ⁴⁷	8-22-34	80	85	
Edison P. C., pfd. ⁴⁷	8-22-34	2	4		Penn. Glass Sand Corp., 6's ⁴⁷	8-22-34	97	100	
Federal P. C., 6 1/2's, 1941 ⁴⁷	8-22-34	30	33		Petoskey P. C., 6's, 1941 ⁴⁸	8-23-34	55	...	
Fla. Port. Cement, 6 1/2's, '37 ⁴⁶	8-27-34	81	...		Petoskey P. C., 6's, 1935-1938 ⁴⁸	8-23-34	60	...	
Florida Port. Cement units ⁴⁷	8-22-34	6	7 1/2		Petoskey P. C. ⁴⁸	8-23-34	2	3	
					Port Stockton Cem., com. ⁹	8-23-34	no market	...	
Giant P. C., com. ⁴⁷	8-22-34	2	4						
Giant P. C., pfd. ⁴⁷	8-22-34	9	11		Republic P. C., 6's, 1943 ⁴⁷	8-22-34	80	85	
Gyp. Lime & Alabastine, Ltd.	8-20-34	5 1/4	actual sale		Riverside Cement, A ⁹	8-23-34	5	7 1/2	20c qu. Aug. 1, '34
Gyp. Lime & Alabastine 5 1/2's, 1948	8-21-34	74	76 1/2		Riverside Cement, B ⁹	8-23-34	1	1	1.50 qu. Aug. 3, '34
					Riverside Cement, pfd. ⁹	8-23-34	80	84	
Hermitage Cement, com. ⁴⁷	8-22-34	6	10		Rockland and Rockport Lime, 1st pfd. ⁴⁷	8-22-34	2	3	
Hermitage Cement, pfd. ⁴⁷	8-22-34	30	35						
Ideal Cement 5's, 1943 ⁴⁷	8-22-34	100	102		Sandusky Cement 6's ⁴⁷	8-22-34	65	70	
Ideal Cement, com.	7-26-34	36	39		Sandusky Cement 6 1/2's, 1932-37 ⁴⁷	8-22-34	65	70	
Indiana Limestone 6's ⁴⁷	8-22-34	14	17		Santa Cruz P. C., com. ⁹	8-23-34	51	55	
International Cem. bonds, 5's, 1948	8-21-34	94	actual sale		Schumacher Wallboard, com. ⁹	8-23-34	1	2 1/2	
International Cement, com.	8-23-34	22 1/2	24		Schumacher Wallboard, pfd. ⁹	8-22-34	1 1/2	3 1/2	
					Signal Mt. P. O., com. ⁴⁷	8-22-34	2	3	
Kelley Island L. and T.	8-23-34	9	10		Signal Mt. P. O., pfd. ⁴⁷	8-22-34	17	20	
Ky. Cons. Stone, 6 1/2's, 1933	8-26-34	5	6		Signal Mt. P. O., 6's, 1936 ⁴⁷	8-22-34	60	100	
Ky. Cons. Stone, com. ⁴⁷	8-22-34	1	2		Southwestern P. C., units ⁴⁶	8-23-34	175	...	
Ky. Cons. Stone, pfd. ⁴⁷	8-22-34	2	3		Standard Paving & Mat. (Can.) com.	8-20-34	1 1/4	actual sale	
Ky. Cons. Stone, 7% pfd. ⁴⁷	8-22-34	3	5		Standard Paving & Mat. pfd.	8-13-34	19	actual sale	
Ky. Cons. Stone, 1st Mtg. 6 1/2's ⁴⁶	8-27-34	9	...		Superior P. C., A ⁴⁰	8-23-34	24	28 55c (2 mos.) Sep. 1, '34	
Ky. Cons. St. V. T. C. ⁴⁶	8-27-34	no market	...		Superior P. C., B ⁴⁰	8-23-34	5	8	
Ky. Rock Asphalt, com. ⁴⁶	8-27-34	40c	...						
Ky. Rock Asphalt, pfd.	7-23-34	6	8		Trinity P. C., units ⁴⁷	8-22-34	24	28	
Ky. Rock Asphalt 6 1/2's, 1935	7-23-34	...	55		Trinity P. C., com. ⁴⁷	8-22-34	1	2	
Kentucky Stone, com. ⁴⁷	8-22-34	...	1/2		Trinity P. C., pfd. ⁴⁷	8-22-34	22	25	
Kentucky Stone, pfd. ⁴⁷	8-22-34	...	5						
Lawrence P. C.	8-10-34	10	actual sale		U. S. Gypsum, com.	8-23-34	40 1/2	40 1/2	25c qu. Oct. 1
Lawrence P. C., 5 1/2's, 1942 ⁴⁷	8-22-34	66	69		U. S. Gypsum, pfd.	8-23-34	134	138	1.75 qu. Oct. 1
Lehigh P. C., com.	8-24-34	13	14 1/2						
Lehigh P. C., pfd.	8-24-34	75 1/2	80	87 1/2 qu. Oct. 1, '34	Wabash P. C. ⁴⁷	8-22-34	6	8	
Louisville Cement ⁴⁷	8-22-34	70	75		Warner Co., ww., 1st 6's ⁴⁷	8-22-34	28	32	
Lyman-Richey 1st 6's, 1935 ⁴⁷	8-22-34	98	100		Warner Co., ex.w. 1st 6's ⁴⁷	8-22-34	25	30	
					Warner Co. com. (sold at auction, Philadelphia)	3-7-34	2 1/2	actual sale	
Marbelite Corp., com. (cement pts.) ⁴⁶	8-23-34	8c	30c		Warner Co. pfd. (sold at auction, Philadelphia)	3-7-34	7 1/2	actual sale	
Marbelite Corp., pfd. ⁴⁶	8-23-34	60c	...		Whitehall Cem. Mfg., com. ⁴⁷	8-22-34	30	35	
Marblehead Lime 6's, 1939	7-21-34	27	32		Whitehall Cem. Mfg., pfd. ⁴⁷	8-22-34	50	55	
Marquette Cement, com. ⁴⁷	8-22-34	17	19		Wisconsin L. & C., 1st 6's, '33 ⁴⁷	8-22-34	95	100	
Marquette Cement, pfd. ⁴⁷	8-22-34	75	85		Wisconsin L. & C., 6 1/2's ⁴⁷	8-22-34	95	100	
Marquette Cem. Mfg. 1st 5's, 1936 ⁴⁷	8-22-34	85	95		Wolverine P. C., com. ⁴⁷	8-22-34	1	2	
Marquette Cem. Mfg. 1st 6's, 1935 ⁴⁶	8-27-34	98	...						
Material Service Corp. ⁴⁷	8-22-34	3	5		Yosemite P. C. A., com. ⁴⁶	8-27-34	1	1 1/2	

Quotations by: ⁹A. E. White Co., San Francisco, Calif. ¹²James Richardson & Sons, Ltd., Winnipeg, Man. ¹³Securities Co. of Milwaukee, Inc., Milwaukee, Wis. ¹⁴Wise, Hobbs & Arnold, Boston. ¹⁵Martin Judge, Jr., and Co., San Francisco, Calif. ¹⁶Nesbit, Thompson & Co., Toronto. ¹⁷First National Bank of Chicago, Chicago, Ill. ¹⁸Anderson Plotz and Co., Chicago, Ill. ¹⁹Hewitt, Ladin & Co., New York, N. Y.

F—Flat. †The payment is on arrears and leaves accumulated unpaid dividends of \$1.92 1/2 a share.

Recent Dividends Announced

Alpha Portland Cement, pfd. (quarterly)	\$1.75	September 15, 1934
Lehigh Portland Cement, pfd. (quarterly) .....	.87½	October 1, 1934
Superior Portland Cement, A (monthly), for 2 mos....	.55	September 1, 1934
U. S. Gypsum, com. (quarterly)25	October 1, 1934
U. S. Gypsum, pfd. (quarterly)	1.75	October 1, 1934

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Kelley Island Lime and Transport Co.,
Cleveland, Ohio, reports for the years ending December 31:

INCOME ACCOUNT		1933	1932
Operating profit	\$325,717	(d) \$4,588	
Depreciation and depletion	109,844		75,762
Selling, administration, and general expense....	189,279		206,959
Operating profit	26,593	(d) 287,308	
Other income	76,128		78,113
Total income	102,721	(d) 209,195	
*Other deductions	31,152		67,151
†Extraordinary charge	300,000		
Net loss	228,430		276,347
Dividends			308,952
Deficit for year	228,430		585,299

*Includes depreciation: 1933, \$15,012; 1932, \$2,864. †Provision for doubtful notes and accounts receivable and for possible loss on impounded bank deposits. Operations of subsidiaries resulted in net losses, for which no provision has been made in above statements, applicable to interest of parent company, as follows: 1933, \$31,450; 1932, \$16,877.

The balance sheet as of December 31, 1933, showed total assets of \$8,811,189 as compared with \$9,210,733 at the end of 1932. Most of the difference was in cash assets, \$215,099 in 1933 against \$813,006 in 1932. Current assets as of December 31, 1933, were \$1,480,972 and current liabilities \$99,955.

The following comments are from the report of G. J. Whelan, president, dated May 15, 1934: "Although business generally is still far below what is considered normal, it is believed that the year 1933 marked the turning point in the most destructive depression the country has experienced. Since the spring of 1933 business has definitely improved. Comparative figures as to railroad car loadings, which, beginning in May, 1933, showed a continued increase over 1932, and similar comparisons in the volume of industrial production in many lines customarily considered as indicative of general business conditions, point to 1933 as the turning point from the continued downward trend which had prevailed until well into that year.

"Our own company's business also showed a definite improvement as is indicated by the results for the year compared with 1932. Up to the end of April, 1933, our sales were 24% lower than for the same period of 1932, but the trend changed during May and at the end of the year we had overcome the loss of the first four months and rounded out the year with sales 27% higher than 1932, with the result that we were able to show a profit of \$71,569.98 after all expenses, depreciation, taxes, etc., compared with a loss of \$276,347.03 in 1932. However, following

our company's usual conservative policy, a reserve of \$300,000 has been set up as a provision for doubtful notes and accounts receivable and for possible loss on impounded bank deposits, which produced a net charge to surplus during the year amounting to \$228,430.02. The amount provided for possible loss on impounded bank deposits is an estimate only and it is hoped that when the bank liquidation is finally completed the actual loss will be less than the amount provided.

"The year brought great changes in the conduct of the business. Following the unprecedented banking crisis, resulting in the nation-wide banking holiday, new legislation initiated by the Administration as a part of its policies for the New Deal brought many problems to industrial management in the process of adjustment to new conditions, an adjustment which is still in progress.

"Your company has given its hearty support to the constructive policies of the Federal Administration in its effort to overcome the depression. Under the National Industrial Recovery Act which became effective on June 16, 1933, each unit of an industry, by accepting the obligations imposed by the act, was given the privilege of co-operating with the other units of the same industry to eliminate the unfair and unsound trade practices that have developed over a period of years. Much time and effort was spent by your management co-operating with others in drafting Codes of Fair Competition and securing their approval. The Lime Industry Code was among the earlier codes approved. The industry had reached the point, due to unfair competitive practices, where some change was imperative. While there was some improvement in the industry prior to the date the code became effective, there can be no doubt that the Recovery Act is responsible for much of the improvement that has taken place, but to it must also be charged certain practices that have been developed by some units of the industry since the code became effective, but which we hope will soon be eliminated by the adoption of proper amendments to the code. These industry codes must be looked upon as more or less experimental; the Federal Administration knew little about their development, and the industries probably knew less, but with the right kind of co-operative effort it should be possible to develop them to where the stockholders, employees and the general public can be benefited. The mineral aggregates code, covering the Crushed Stone, Sand and Gravel, and Slag Industries, was approved November 10, 1933. We produce crushed stone and sand and are therefore very much interested in the effect of this code on the industry, but its influence was not felt in 1933 and the administration of the code has been retarded somewhat by its complications, although we believe it should ultimately be a benefit.

"One of the principal parts of the Recovery Act is that referring to employees.

Your management has followed the letter and spirit of the law in this regard and expects to continue to do so in such a way that the interests of our stockholders and of our employees will be best protected.

"The products of our company are sold principally to the steel and construction industries. The steel industry improved considerably during the past year and operations in that industry are continuing at a much better rate than they were a year ago. That the steel industry is expecting further and continued improvement is shown by the early estimates of the amount of iron ore that will be required to be brought down the lakes this season. The Lake Carriers' Association reports that the lake movement of limestone responds quickly to the upward or downward trend of the iron ore trade, and the present trend is upward. In 1933 our total shipments of all kinds of stone were approximately 70% higher than for 1932.

"There has not been such a marked increase in activity in the construction industry as that shown by the steel trade. The demand for our lime and other products used in construction is therefore retarded and our shipments in 1933 of all burned products were only slightly higher than for 1932. A very large proportion of recent construction projects have been financed by the Federal Government and this is continuing in 1934. While the first quarter of 1934 has developed a building volume far ahead of the same period of 1933, construction is lagging behind other business and probably will until private financing of construction projects is restored.

"The critical banking situation of the spring of 1933 required those responsible for the direction and management of industries to exercise the utmost caution to conserve the resources of their companies. At that time, as reported to you last year, the board of directors was unanimous in deciding to defer the payment of the April 1, 1933, dividend, and the continuation of subnormal conditions, with the great uncertainty of the future, led to similar action during the balance of the year. However, in view of the fact that the year closed with a moderate profit, exclusive of the special reserve referred to, and with the prospects brighter for continued improvement during 1934, a dividend at the rate of 15c. per share was paid on April 1, 1934, and it is hoped that as the year goes on further payments to the holders of our shares may be made.

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Consolidated Cement Co., Chicago, Ill.:

A temporary trusteeship was approved June 26 by Judge Richard J. Hopkins in the United States district court at Topeka, Kan. The trusteeship was sought under provisions of the national bankruptcy law. Stanton G. Stewart of Kansas City, Kan., and W. G. Storey of Chicago, Ill., were appointed trustees. The company's headquarters are in Chicago, but its principal plants are located in Kansas. One is at

Fredonia and another is at Mildred. The company has been in receivership for some time. The receivers' operating report shows a net operating profit for the five months to May 31, 1934, of \$118,199 against a net operating profit of \$124,476 for the entire year of 1933. In 1932 there was a \$116,286 deficit. Current assets as of December 31,

1933, were \$658,555 and current liabilities \$48,915.

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Missouri Portland Cement Co., St. Louis, Mo.: Stockholders, on June 12, authorized reduction in capital from \$9,000,000 to \$7,500,000, transferring \$1,500,000 to surplus account.

Code Developments

Crushed Stone, Sand and Gravel and Slag Industries: NRA has quite specifically defined the application of the President's executive order of June 29, inviting price cuts to government agencies from 5 to 15% of prices posted under the code. Here are some of the official interpretations: (1) The responsibility of a member of the industry who quotes less than his filed prices, as permitted by the executive order, is to inform the district committee of the measure of the tolerance of which he has availed himself.

(2) There is no responsibility on the part of the member of the industry to make the bid price reflecting the tolerance under his filed prices, available either to purchasers of materials or to any intermediate party, which are between him and the body politic, such as a contractor or dealer. He is not empowered to sell below his filed prices to commercial purchasers.

(3) The executive order does not modify or impair the price structure of members of the industry, other than on the specific project with a governmental agency, and it does not oblige members of the industry to quote or to sell at the price specified in such a bid on any business other than that specifically bid upon.

(4) Under the executive order, a producer may bid 15% below his published plant price, if his prices are filed upon a plant basis and 15% below his published delivered price, if prices are quoted upon a delivery basis. All elements which are included in a delivered price may be included when estimating the amount of the tolerance.

The NRA also expressed the opinion that the entire purpose of the executive order was not merely to avoid receipt by bodies politic of uniform quotations on individual projects.

The chairman of the Code Authority has officially protested the executive order to the NRA administrator in a letter in which he stated: "The Code signed by the President on November 10 was a true reconciliation of viewpoint between our industries and the Administration. If it had not been changed by the executive order of June 29, we should have been perfectly content to abide by its provisions and to use its instrumentalities in effecting that degree of stability which the Recovery Act demands. The provisions of our Code permit a free and full play of economic forces under the use of the open price policy, and we have never sought

right price fixing in our industries. Since the approval of the Administration of out-the members of our industries are permitted by our Code to file such prices as seem fair to them, subject only to an individual basement level of out-of-pocket expenses plus 10%, I submit that the executive order of June 29 represents an unfortunate attempt to generalize in behalf of all industry codes, and further that its application to our industries restores the unfortunate conditions which existed prior to the conception of the Recovery Act and which are responsible, to an important extent, for the economic crisis which confronted the country at that time."

Chairman Graves' protest was supported by data supplied by the technical advisory staff of the Code Authority which covered comprehensively the (1) financial status of the industries; (2) sales, price trends, and expenses; (3) employment and wages.

These data show that in 1929 the average net profit per company was \$34,000 for sales of \$264,000; in 1932 with 35% of the 1929 dollar volume of sales the average net loss per company was \$14,900; in 1933 with 30% of the 1929 dollar volume (\$79,000) the average net loss was \$10,700. The number of employees per 100,000 tons of sales increased from 88 in 1929 to 145 in 1934, and the payroll from \$21,200 to \$22,600, although the average income for each employee during May and June went from \$242 in 1929 to \$156 in 1934.

Eldred Crushed Stone Co. (Illinois) case is receiving widespread publicity because of the activities in its behalf by the late speaker of the House of Representatives, Congressman Rainey. The *New York Herald Tribune* of August 20 contains a signed article by Mark Sullivan, its Washington correspondent, in which he "tells how rural quarry has been forced to remain idle 7 months pending decision on minimum wage appeal"—according to the headline. Mr. Sullivan uses this case to knock NRA as fostering big business and monopoly. Obviously, it is unfortunate that this case and all others can not be settled on its merits without involving politics—but, at least it will serve as an example that government supervision of industry never can prove satisfactory because the political issue can never be kept from being the all-important one in any government decision.

Region No. 1, Districts 1 and 2, have had

their uniform terms of sale and uniform terms of discount officially approved.

Soft Lime Rock Industry: The following members of the Code Authority have been officially approved: J. F. Loudon, Marianna Lime Products Co., Marianna, Fla.; W. M. Palmer, Dixie Lime Products Co., Ocala, Fla.; L. B. McLeod, McLeod Milling Co., Williston, Fla.; Alexander Brest, Jacksonville, Fla.; Emmett Cleary, Williston Shell Rock Co., Newberry, Fla., and S. B. Brinson, Peninsular Lime Rock Co., Tampa, Fla.

Sand-Lime Brick Industry: The Code Authority has submitted for approval a \$1,860 budget to cover code administration expense for the period between April 6, 1934, and March 31, 1935. Contributions from members of the industry to support the budget would be based as follows: 5c. per M for standard size brick invoiced each month; 50c. per M for 8 in. x 16 in. size block invoiced monthly. Non-standard sized brick would be assessed in the proportion that the plant selling price bears to the plant selling price of the standard size. The Code Authority estimates that 38,000,000 bricks will be sold during the budget period.

Gypsum Industry: Following members of the Code Authority have been officially approved: M. H. Baker, Buffalo, N. Y.; J. C. Best, Medicine Lodge, Kan.; Arthur R. Black, Port Clinton, Ohio; C. O. Brown, New York, N. Y.; A. J. Campbell, New York, N. Y.; T. P. Eldred, Utica, N. Y.; S. M. Gloyd, Oklahoma City, Okla.; R. B. Henderson, San Francisco, Calif.; C. F. Henning, Chicago, Ill.; Eugene Holland, Chicago, Ill.; James Leenhouts, Grand Rapids, Mich.; L. I. Neale, New York, N. Y.; George N. Lenci, New York, N. Y.

The following committee has been approved for handling trade practice complaints: M. H. Baker (chairman), Gypsum Industry Code Authority, president, National Gypsum Co., Buffalo, N. Y.; C. F. Henning, vice-president, United States Gypsum Co., Chicago, Ill.; R. B. Henderson, president, Pacific Portland Cement Co., San Francisco, Calif.; George N. Lenci, secretary, Ebsary Gypsum Co., New York, N. Y.; James Leenhouts, general manager, Grand Rapids Plaster Co., Grand Rapids, Mich.; and F. D. Hansen, representative of the Administrator, Milwaukee, Wis.

Ready-Mixed Concrete Industry: Approval of the method of election of the Greater Cleveland Marketing Area Committee, authorized under the code. Its personnel follows: J. D. Kling, Metropolitan Concrete Co., and J. M. Truby, Ohio Building Material Co., both of Cleveland.

The San Francisco marketing area committee follows: Irving Rhein, Bode Gravel Co., 235 Alabama St.; C. Stephens, Frank Harrison, alternate, Golden Gate Atlas Materials Co., 16th and Harrison Sts.; E. Peterson, S. C. Nunan alternate, Readymix Concrete Co., Limited, Carolina and Mariposa Sts., all in San Francisco.

Editorial Comments

The present epidemic of "business blues" is too widespread and apparently too genuine to be accounted for wholly as a political symptom of the coming elections. This pessimism probably is the actual result of much honest uncertainty as to the next moves of the

Let's Be Optimists!

NRA, the Administration, Congress, or what not. Continued doubt, lack of self-confidence and skepticism certainly promote pessimism in individuals, and when a great many individuals suffer from them at the same time we must have a condition of mass psychology that results in such business sentiment as we now have in evidence.

It is regrettable that there is not more talk and print about the glorious prospects of making this country the most ideal place in the world to live and do business in, and less about the mistakes of NRA and the misunderstanding of the labor clauses of the NIRA, etc., etc. This could be done and at the same time keep the political motive which seems to permeate all current literature, without the depressing effect of constant fault-finding.

Aren't we all expecting too much of government? Isn't the real thing lacking not brains in government, not labor's coöperation, not capital, but a spirit of optimism, that led to all our advances in the past and will lead to new and greater ones in the future? However much we may challenge the words and acts of the President as helping or retarding business recovery, we can all sincerely admire his unfailing optimism and his apparent faith in the ultimate success of our social and industrial experiments.

And what basis for a spirit of optimism now? may be asked. A very substantial basis, we would say—a basis of American coöperation on a broader scale than we have ever attempted before. Our forefathers learned to coöperate to the extent of establishing a government which gave its people the greatest opportunities for satisfying their individual material wants and desires that any people every dreamed of. That some of this people's wants should prove insatiable, and that the methods used by this minority for obtaining the wherewithal to satisfy them should prove unethical, to put it mildly, was inevitable, since humans are constituted as they are.

It was just as inevitable that in progressing we should enter a new phase of coöperation in which we will try to find the answer to the problem of keeping open the gates of individual opportunity, while at the same time preventing those few piggish members of society from taking such undue advantage of the opportunity as to destroy that of the more public-spirited majority. In a large measure the NRA is the blossoming of the tree of the American trade association, which has been attempting to educate business and industry in developing coöperative policies these many years. The fruit of the tree, moreover, will probably be bigger and better trade associations, able and willing to take the responsibility for the policies and acts

of their industries, and answerable to government only as to whether or not these policies and acts are helpful or hurtful to the public welfare. The NRA, considered from this angle, is making a brave and determined attempt to educate all industry in the elements of coöperative policy and to inculcate some of the principles of fair and decent competition.

While much of the business press apparently found the President's Green Bay, Wis., address disappointing and has picked many flaws in it, there are some significant passages that show clearly the working of the President's mind and make his optimism the more praiseworthy in place of the pessimism that the same line of thought produces in many business men. Let us quote: "Man is fighting those forces which disregard human coöperation and human rights in seeking that kind of individual profit which is gained at the expense of his fellow. It is just as hard to achieve harmonious and coöperative action among human beings as it is to conquer the forces of nature. Only through the submerging of individual desires into unselfish and practical coöperation can civilization grow. * * * * There is the man whose objectives are wholly right and wholly progressive but who declines to coöperate or even to discuss methods of arriving at the objectives because he insists on his own methods and nobody else's. The other type is the individual who demands some message to the people of the United States that will restore what he calls 'confidence.' * * * * There is no lack of confidence on the part of those business men, farmers and workers who clearly read the signs of the times. Sound economic improvement comes from the improved conditions of the whole population and not the small fraction thereof."

Of course, a cynic could pick flaws even in so fine a sentiment as expressed in those sentences. He would say that *all* individual profit "is gained at the expense of his fellow," by one man being smarter than another; and he would point out the absurdity of "unselfish" coöperation in business, when the ultimate end of all business enterprise is essentially wholly selfish. But the President is no impractical dreamer; he is an especially capable politician or statesman with a keen insight into human nature. His terms are not to be taken too literally. Nevertheless, all progress in civilization is accounted for by some degree of unselfishness in the individual's conception of his own rights and privileges; obviously the business and industrial sphere of life is the last to yield to appeals for unselfishness; but it is a sphere of life in which the President and a great many other intelligent men believe the introduction of a little more unselfishness will help solve problems, including a cure for the present "business blues" and promotion of "business confidence," which is really self-confidence—each individual's confidence in his ability to meet any condition the future may bring forth.

TRAFFIC and TRANSPORTATION

Proposed Rate Changes

THE FOLLOWING are the latest proposed changes in freight rates up to and including the week of August 11:

New England

33478. **Stone, crushed**, when coated with tar, asphalt, oil or any bituminous binder, in bulk in gondola or other open top cars (See Note 3), Rocky Hill, Conn., to Manchester Bridge and Poughkeepsie, N. Y. Present, \$1.45 per net ton; proposed, Manchester Bridge, \$1.15; Poughkeepsie, \$1.10 per net ton.

Trunk

32640. **Stone, broken or crushed**, C. L. (See Note 2), from Cobleskill, N. Y., to South Gilboa and Grand Gorge, N. Y., \$1.20 per net ton. Present rates, \$1.80 and \$1.90 per net ton.

32647. **Slate, crushed, dust, ground, refuse and scrap**, C. L., minimum weight 50,000 lb., from Fair Haven, Vt., to Castleton, Vt., inclusive, and Poultney, Vt., to West Pawlet, Vt., inclusive, to Portneuf, Que., 21c per 100 lb. Present rate, 34c per 100 lb., sixth class.

32648. **Sand, viz., blast, engine, fire, foundry, glass and molding**, C. L. (See Note 2), from Slaton, Penn., to Phillipsburg, N. J. Proposed rate, 90c per net ton.

Sup. 1 to 32388. **Sand**, in open top cars, without tarpaulin or other protective covering, C. L. (See Note 2), from Berkeley Springs, Great Cacapon and Hancock, W. Va., to Pen Argyl, Bangor and East Bangor, Penn., \$1.90 per net ton.

32659. **Sand, viz., glass, engine, molding, ground flint, quartz and sillex**, in straight or mixed carloads (See Note 2), from Mapleton district, Penn., to Red Mill, Que., \$5.30 per net ton. Present rate, 37c per 100 lb., sixth class.

32663. **Limestone, unburned, ground**, C. L., minimum weight 50,000 lb., from Natural Bridge, N. Y., to Holyoke, Springfield, Mass., 17c; Pepperell, Lawrence, Boston, Mass., 19c, and Portsmouth, N. H., 20½c per 100 lb.

32665. **Sand**, C. L., minimum weight 100,000 lb. (when 90% of marked capacity of car is less than 100,000 lb.) (See Note 3), from Norfolk Yard, Va., to points on the C. & O. Ry., K. G. J. & E. R. R., N. & W. Ry., and Vgn. Ry., Fort Monroe, Newport News, Clifton Forge, Esmond, Va., *Hinton, *Lillybrook, *Mill Creek Mine, *Tamroy, W. Va., Gilmerton, *East Radford, Norcross, *Pocahontas, Va., *June, *Blount, W. Va., Algren, Va., *Kellyville, *Helen, *Maben, *Sugar Creek Jct., W. Va., and various, rates ranging from 75c to \$2.45 per net ton.

*Applicable only on shipments loaded in empty coal cars.

32388. **Sand**, in open top cars, without tarpaulin or other protective covering, C. L. (See Note 2), from the Millville-Menantico district to Pen Argyl, Bangor and East Bangor, Penn., \$1.90 per net ton.

32690. Cancel commodity rates on **granite dust and granite screenings** from Pompton, N. J., to Harrison, Newark and Rutherford, N. J., classification basis to apply.

32698. **Silica sand**, C. L. (See Note 2), from Mapleton district, Penn., to Niagara Falls and Thorold, Ont., \$3.20 per net ton.

32714. **Sand, other than blast, engine, molding, etc., and gravel**, in open top cars, C. L. (See Note 2), from P. R. S. L. and C. R. R. of N. J. to Group 1 South Jersey origin points to Beaver Meadow, Centralia, Freeland, Jeddo and Leviston, Penn., \$1.80 per net ton.

32717. **Stone dust**, in bags, C. L. (See Note 2), from Millington to Manville, N. J., \$1.10 per net ton.

32718. **Sand, common, building and engine** (in open top equipment), **gravel and crushed stone**, C. L. (See Note 2), from Cumberland, Md., to Wyatt, W. Va., \$1.40 per net ton.

32707. (A) **Building sand**; (B) **Engine, blast, glass and molding sand, and ground flint**, C. L. (See Note 2), from Hancock, Great Cacapon and Berkeley Springs, W. Va., to Newtown, Penn., (A) \$2.40, and (B) \$2.60 per net ton.

32738. **Sand** (blast, engine, filter, fire, foundry, glass, moulding, quartz, sillex or

silica and gravel, in box cars or other closed equipment, C. L., (See Note 2), from points on the P. R. S. L. R. R. in the Woodbury, Vineland, Pomona, West Collingswood, Atco, Tuckahoe, N. J. Districts—to Selbyville, Del., \$2.70 per net ton.

32741. **Sand** (blast, engine, fire, foundry, glass, moulding or silica), C. L., (See Note 2), from Cossackie, N. Y., to Lennoxville, Sherbrooke, Que., 16c, and St. Johns, Que., 14c per 100 lb.

32770. **Stone, crushed, coated with oil, tar or asphaltum**, C. L., (See Note 2), from Schenectady, N. Y., to Margaretville, Harvard, Conklin, Norwich, Richfield Springs, Pond Eddy, Deposit and Owego, also Middleburg, High View, Monticello, Walton, New Berlin Jct., Randallville, Churubusco, Champlain, Schoharie, West Oneonta, River Forks and New Berlin, N. Y., and various, rates ranging from \$1.10 to \$2.20 per net ton.

Central

40420. To establish on **sand** (other than blast, core, engine, fire, foundry, glass, moulding, quartz, sillex or silica) and gravel, in straight or mixed carloads, from Hunter, Pa. (Rates in cents per net ton.)

To	Proposed	Route
Tidiloute, Penn.	60	A
Struthers, Pa.	70	A
Corydon, Penn.	80	A
Pittsfield, Penn.	70	A
Lovell, Penn.	80	A
Jackson, Penn.	90	A
Erie, Penn.	100	A
Oil City, Penn.	60	A
McClintock, Penn.	60	A
Hydetown, Penn.	70	A
Spartanburg, Penn.	80	A
South Oil City, Penn.	60	A
Brandon, Penn.	70	A
Foxburg, Penn.	80	A
Red Bank, Penn.	90	A
Morrison, Penn.	80	A
West Line, Penn.	90	A
Ludlow, Penn.	80	A
Kane, Penn.	90	A
Cochran, Penn.	100	B
Meadville, Penn.	100	B
Cambridge Springs, Penn.	110	B
Polk, Penn.	90	C
Stoneboro, Penn.	100	C
Jamestown, Penn.	110	C
Simons, O.	110	C

Routes:

A—P. R. R. direct.
B—P. R. R.—Oil City, Penn.—Erie R. R.
C—P. R. R.—Oil City, Penn.—N. Y. C. R. R.

Present—Sixth class.

40421. To establish on **sand, blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica**, in straight or mixed carloads, in open top equipment, from Brink Haven, O., to Ashland, O., rate of 90c per net ton.

Route—Via P. R. R.—Mansfield, O., and Erie R. R. Present—120c per net ton.

40422. To establish on **sand, blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica**, C. L., from Ellwood Junction and Koppel, Penn.

To	Prop.	Pres.
Montour Jct., Penn.	113c N. T.	10
North Star, Penn.	113c N. T.	12
Muse, Penn.	113c N. T.	12
Snoden, Penn.	113c N. T.	12
Brighthelm, Penn.	113c N. T.	12

Sixth class.

Route—Via P. R. R.—McDonald or Hills, Penn., and Montour R. R.

40423. To establish on **sand, blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica**, in straight carloads, from Ellwood Jct. and Koppel, Penn., to Buffalo, N. Y., rate of 176c

per net ton. Route—Via P. R. R. direct. Present—227c per net ton.

40424. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel**, in open-top cars, C. L., from South Bend, Ind. (Rates in cents per net ton.)

To	Prop.	Pres.
Walkerton, Ind.	63	180
Hamlet, Ind.	65	200
Knox, Ind.	70	220
Rye, Ind.	70	220
North Judson, Ind.	75	240
San Pierre, Ind.	75	240
Wheatfield, Ind.	80	260
Kersey, Ind.	85	260
Forest City, Ind.	85	280
Shelby, Ind.	90	280
Schneider, Ind.	90	280

40426. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica) and **gravel**, in open-top cars, C. L., from Dresden, O., to Alexandria, O., rate of 80c per net ton. Route—Via P. R. R.—Heath, O., and N. Y. C. R. R. Present—90c per net ton.

40427. To cancel rates on:

(a) **Stone, crushed, and screenings**, in open cars, in bulk, from Fetterman, Wampum, Penn., and Lisbon, O., to destinations in states of Illinois, Indiana, Iowa, Kentucky, Maryland, Missouri, New York, Ohio, Pennsylvania, West Virginia and Wisconsin.

(b) **Stone, dolomite or fluxing**, from Hillsville, New Castle and Walford to Wardwell and Warren, O.; from Mingo Jct., O., to Columbus, O., New Castle, Bessemer, Munnah, South Duquesne, Penn., and Zanesville, O.

(c) **Furnace and foundry limestone**, from Follansbee, W. Va., to Toronto, O.

(d) **Limestone, crude refuse**, from New Cumberland, W. Va., to Neville Island, Penn.

(e) **Refuse limestone screenings or limestone**, quarry waste, from Wampum, Penn., to Crescentdale, Penn.

(f) **Stone, rip rap and rubble**, from Pittsburg, Penn., to McDonald, Penn., published in P. R. R. Tariff 122-A, account obsolete.

40419. To establish on (a) **sand** (other than blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica) and **gravel**, C. L., from Lake Cicott, Ind., to Monticello and Reynolds, Ind., rate of 40c per net ton. (b) **Sand and gravel and crushed stone**, C. L., from Kenneth, Ind., to Monticello and Reynolds, Ind., rate of 90c per net ton.

40554. To establish on **sand, viz., lake, river and bank, other than sand loam**, C. L., to Terre Haute, Ind., from Calumet, Crocker, Gary and Willow Creek, Ind., rate of 140c per net ton. Route—Via Wabash Ry., Chicago, Ill., C. & E. I. R. R.

40472. To establish on **crushed stone**, C. L., from Keopert to Rochester, Ind., rate of 80c per net ton. Route—Via Wabash Ry., Peru, Ind., N. Y. C. & St. L. R. R.

40578. To establish on **agricultural limestone, and screenings, agricultural limestone**, in open top cars, C. L., from Spore, O.

To	Prop.	To	Prop.
Andover, O.	135	Minerva, O.	125
Bayard, O.	125	New Comerstown, O.	115
Bergholz, O.	125	New Philadelphia, O.	115
Bowenston, O.	125	Niles, O.	125
Braceville, O.	125	Newton Falls, O.	125
Dorset, O.	135	Phalanx, O.	125
Dover, O.	115	Ravenna, O.	115
East Liverpool, O.	135	Salem, O.	125
Girard, O.	125	Sherrods, O.	115
Hubbard, O.	135	Struthers, O.	135
Kent, O.	115	Uhrichsville, O.	125
Jewett, O.	125	Valley Jct., O.	115
Latimer, O.	135	Warren, O.	125
Leavittsburg, O.	125	Washingtonville, O.	125
Leetonia, O.	125	O.	125
Lisbon, O.	135	Yellow Creek, O.	135
Lordstown, O.	125	Youngstown, O.	125
Lowellville, O.	135		
Mineral City, O.	115		

Rates in cents per net ton. Present, sixth class per official classification.

40529. To establish on **screenings, agricultural limestone**, C. L., from Spore, O.

To	Prop.	*Pres.
Lodi, O.	95c N. T.	13
Armstrong, O.	95c N. T.	15
Cedar Valley, O.	100c N. T.	15
Wooster, O.	95c N. T.	15

*Sixth class.

40473. To establish on **sand, viz., lake, river and bank, other than sand loam**, C. L., from Calumet, Gary and Willow Creek, Ind., to Mattoon, Ill., rate of 170c per net ton. Route—Via Wabash Ry., Chicago, Ill., I. C. R. R.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

40474. To establish on **stone, crushed, slag and/or gravel**, coated with oil, tar or asphaltum (see note), in open top cars, C. L.

Note—The oil, tar and/or asphaltum not to exceed 10% by weight of the commodity shipped, the shipper to so certify on shipping orders or bills of lading. (Rates in cents per net ton.)

	Pres.	Prop.
To Grafton, W. Va.		
From Marble Cliff, O.....	328	240
To Grafton, W. Va.		
From West Columbus, O....	328	240
To Grafton, W. Va.		
From Marion, O.....	328	260
To Grafton, W. Va.		
From South Lebanon, O....	328	280
To Fairmont, W. Va.		
From Marble Cliff, O.....	328	240
To Fairmont, W. Va.		
From Columbus, O.....	328	240
To Fairmont, W. Va.		
From Marion, O.....	328	260
To Fairmont, W. Va.		
From South Lebanon, O....	328	280
To Clarksburg, W. Va.		
From South Lebanon, O....	328	260
To Morgantown, W. Va.		
From South Lebanon, O....	328	280

40255. Withdrawal notice. White Docket Advice 40255, Docket Bulletin 2490, dated June 26, 1934, covering proposal to establish rate of 230c per net ton on **sand**, treated with oil, tar or asphaltum, in open top cars, C. L., from Chicago, Ill., to Marshall, Mich., is hereby withdrawn from the docket.

32678. **Glass sand**, C. L. (See Note 2), from Gore, Va., to Kingsport, Tenn., \$2.25 per net ton.

40598. To establish on **limestone dust**, in packages, C. L., minimum weight 40,000 lb., from Columbus, O., to N. & W. Ry. stations east of Ceredo and Kenova, W. Va., and west of Salem, Va.

Miles	($\frac{1}{2}$)	($\frac{1}{4}$)	Miles	($\frac{1}{2}$)	($\frac{1}{4}$)
30.....	3½	10	200.....	8	20
40.....	4½	11	230.....	9	21
50.....	5	12	260.....	9½	23
60.....	6	13	290.....	10	24
70.....	6½	15	360.....	11	26
80.....	7	17	361 & over..	11½	26
100.....	7½	18			

†Proposed rates.

§Present rates, I. C. C. Docket 15879, sixth class rates.

†Applicable for 361 miles.

Route—Via N. & W. Ry. direct.

40599. (a) To cancel from N. & W. Ry. Tariffs I. C. C. Nos. 8597 and 8626, all rates on **sand and gravel**, C. L., from Gravel Pit, O., to points in Ohio, Kentucky, West Virginia, etc., account obsolete. (b) To establish on **sand and gravel**, C. L., rates in cents per net ton.

To	Prop.	Route
Augusta, Ky.	100	1
Ausanba, Ky.	110	1
Bradford, Ky.	100	1
Broshears, Ky.	110	1
California, Ky.	90	1
Carntown, Ky.	100	1
Dam No. 35, Ky.	90	1
Dover, Ky.	110	1
Foster, Ky.	100	1
Glen Park, Ky.	90	1
Ivor, Ky.	100	1
Mayville, Ky.	110	1
Melbourne, Ky.	90	1
Mentor, Ky.	90	1
New Richmond, Ky.	90	1
Oncoata, Ky.	90	1
South Ripley, Ky.	110	1
Wellsburg, Ky.	100	1
Willow Grove, Ky.	100	1
Bainbridge, Ky.	100	2
Route 1—N. & W. Ry., Cincinnati, O., C. & O. Ry.		
Route 2—N. & W. Ry., Glen Jean, O., D. T. & I. R. R.		

Present, class rates.

40711. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica), and **gravel**, in open top cars, from Painesville, O., in cents per ton of 2,000 lb.

To	Prop.	Pres.
Akron, O.	90	260
Alliance, O.	100	300
Aurora, O.	85	260
Bedford, O.	80	240
Brecksville, O.	80	240
Chagrin Falls, O.	85	240
Congress Lake, O.	95	300
Garrettsville-Hiram, O.	95	260
Hudson, O.	85	240
Kent, O.	90	260
Ravenna, O.	90	260
Solon, O.	80	240

40660. To establish on **crushed stone**, coated with oil, tar or asphaltum, in bulk, in open top equipment (the oil, tar and/or

asphaltum not to exceed 10% by weight of the commodity as shipped, the shipper to so certify on shipping orders and bills of lading). (See Note 3). (Rates in cents per ton of 2000 lb.)

From Erie, Penn., to	Prop.	Pres.
Kane, Penn.	113	300
Sheffield, Penn.	103	280
Irvinton, Penn.	93	260
Colza, Penn.	83	240
Waterford, Penn.	73	180
Corydon, Penn.	113	300
Sugar Run, Penn.	103	300
West Line, Penn.	113	300
Jamestown, Penn.	93	260
Trunkville, Penn.	103	300
West Hickory, Penn.	113	300
Tionesta, Penn.	113	300
President, Penn.	113	300
Oil City, Penn.	113	300
McClintock, Penn.	103	300
Hydetown, Penn.	93	260
Center Road, Penn.	83	240

Route—P. R. R. direct.

40662. To establish on **stone, crushed, slag and/or gravel**, coated with oil, tar or asphaltum (see note) in open top cars (See Note 3), South Lebanon, O., to New London, Mo., \$3.89 per net ton.

Note—The oil, tar and/or asphaltum not to exceed 10% by weight of the commodity shipped, the shipper to so certify on shipping orders or bills of lading.

Present, \$5.80 per net ton.

40628. To establish on **sand** (other than blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica) or **gravel**, in open top cars, C. L. (See Note 3), from Burbank to Crestline, O., rate of 85c per net ton. Present—100c per net ton, in effect from Barborton, O., and Burbank, O., is intermediate thereto.

40635. To establish on **crushed stone**, C. L., from Keopert, Ind., to Delphi, Ind., rate of 60c per net ton. Route—Via Wabash Ry. direct. Present, 65c per net ton.

40632. To establish on **crushed stone**, C. L. (See Note 3), from Greencastle, Ind., to Helmsburg, Ind., rate of 90c per net ton.

5887. **Asphaltic limestone, broken, crushed or ground**, C. L., from Margerum, Ala., to Wausau, Columbus and Eau Claire, Wis. Lowest combination now applies. Proposed rate on asphaltic limestone, broken, crushed or ground, C. L. (See Note 3), (applicable on asphaltic limestone to which asphalt has been artificially added), from Margerum, Ala., to Wausau, Wis., 400c; to Columbus, Wis., 360c; to Eau Claire, Wis., 440c per net ton.

Southern

5728. **Limestone, ground or pulverized**, C. L., from Mosher and Ste. Genevieve, Mo., to Memphis, Tenn. It is proposed to establish rate of 130c per net ton, (See Note 3), from and to above named points. Same as the rate suggested under Submittal No. 5085, from Valmeyer, Ill., to Memphis, Tenn.

5768. **Crushed stone**, C. L., from Latham, Ky., to Hartford, Ky. (Intrastate). Present rate, 90c per ton of 2000 lb. Proposed rate on crushed stone, C. L. (See Note 3), from and to points mentioned, 70c per ton of 2000 lb. To expire September 30, 1934, unless sooner canceled, changed or extended.

5776. **Sand**, C. L., from stations on the Norfolk Southern R. R. to stations on the Buchanan and Levisa branches of the Norfolk & Western Ry. In lieu of combination basis now applicable it is proposed to establish rate of 216c per net ton on sand, C. L., from stations taking Group 1 in N. S. R. R. I. C. C. No. A-735 to stations located on the Buchanan branch and the Levisa branch of the N. & W. Ry.

Western

Sup. 1 to D-41-22. **Sand**, C. L. (See Note 2), but not less than 40,000 lb., from Red Wing, Minn., to Bay City, Mich. Rates: Present, 442c per net ton; proposed, 374c per net ton.

C-41-27. **Stone, crushed**, C. L., (See Note 3), but not less than 50,000 lb., from Dell Rapids, S. D., to Mosher, Witten and Wood, S. D. Rates, present, combination of locals. Proposed, to Witten, 16½c per 100 lb.; Mosher, 17½c per 100 lb., and Wood, 18½c per 100 lb.

D-41-24. **Limestone, crushed or ground**, in bags, C. L. (See Note 2), but not less than 40,000 lb., from Alden, Ia., to stations in Minnesota and south of the line of the C. M.

St. P. & P. R. R., Ortonville to St. Paul. Rates: Present—Class E or combination basis. Proposed—Distance scale as follows, to be applied for the short line mileage, such short line mileage to be computed via short workable routes via not to exceed three lines:

Miles	Cents	Miles	Cents
80.....	7.5	200.....	9
90.....	7.5	225.....	10
100.....	7.5	250.....	10
115.....	8	275.....	11
130.....	8	300.....	11
145.....	8	325.....	12
160.....	8	350.....	12
175.....	9		

Above basis to apply for both single and joint line hauls, and if approved, rate check to be held to check specific rates for publication.

Sup. 1 to E-41-23. Rates: **Limestone, agricultural, ground or pulverized**, in bags, barrels or in bulk, for soil treatment (See Note 2), from Omaha, Neb., to destinations in Iowa on the Wabash Ry. Rates: Present, Class "E"; proposed (in cents per ton of 2000 lb.):

Miles	Miles	Miles
40.....59	120.....102	190.....131
50.....63	130.....107	200.....135
60.....67	140.....111	210.....138
70.....71	145.....113	220.....141
80.....76	150.....115	225.....144
90.....82	160.....119	230.....144
100.....88	170.....123	240.....147
110.....96	175.....125	250.....150
115.....99	180.....127	

Southwestern

3763. **Sand**, from Webb City, Mo., to Memphis, Tenn. To establish a rate of 226c per ton of 2000 lb. on sand, N. O. I. B. N., minimum weight per item 60, S. W. L. Tariff 162-H, from Webb City, Mo., to Memphis, Tenn.

3768. **Bituminous asphalt rock**, from Worland, Mo., to points in Illinois, Iowa, Kansas, Minnesota, Missouri, etc. Add Worland, Mo., as a producing point in item 927-D, Supplement No. 78, W. T. L. Tariff 91-G, on the same mileage basis as other points shown therein. Add Worland, Mo., as a producing point in Mo. Pac. Tariff No. 1464-I and W. T. L. Tariff 18-M, at the same rates as now apply from Pleasanton, Kan.

Texas-Louisiana

8691-5-TX. **Sand and gravel**, C. L., from Ady, Ady Gravel Spur, Tascosa, Magenta and Murdo to Amarillo. Proposition from shippers to establish the following rates to Amarillo, Tex.: From Ady and Ady Gravel Spur, 45c; Tascosa, 51c; Magenta and Murdo, 57c. The rates are to meet truck competition.

9471-TX. **Crushed stone**, C. L., from Lester to Tulla, Eunice and Kress, Tex. Proposition from carriers to establish rate 52c per 100 lb. on crushed stone, C. L., (See Note 3), from Lester, Tex., to P. & S. F. Ry. stations, Tulla, Eunice and Kress, Tex. Proposed rate will enable carriers to secure additional traffic that has heretofore been moving via trucks.

9485. **Sand and gravel**, straight or mixed carloads, from Kilmek, Tex., to Groveton and Westville, Tex.: Proposition from carriers to establish rate of \$1.26 per ton to Westville, Tex., and \$1.31 per ton to Groveton, Tex., subject to standard minimum weight. Such rate to expire December 31, 1934.

Illinois

7894. **Stone, crushed, broken; chatts; gaster, ground; limestone, agricultural; macadam; rubble; slag, crushed, etc.** (See Note 3), from Lehigh, Ill., to Elmhurst, Ill., and Rockford, Ill.

I. C. C. Decisions

24840. **Sand and Gravel**. East Tennessee Sand and Gravel Co. vs. Southern Railway Co. et al. By the Commission. Reversal of original report holding that certain Virginia intrastate rates in carloads were unduly preferential of shippers in intrastate, and unduly prejudicial to shippers

in interstate commerce. (This decision applies also to case of American Limestone Co. vs. Southern Railway Company et al., docketed as a sub-number.)

25428. Cement. Beaver Portland Cement Co., et al. vs. California Central Railroad Co. et al. By division 3. Complaint dismissed. Rates in carloads from California points to ports in the same state for trans-shipment by water to points in Oregon and Washington, held not unduly prejudicial, unduly preferential, or otherwise unlawful.

26073. Sand. Olean Glass Co., Inc., vs. Pennsylvania Railroad. By division 3. Reparation awarded. Glass sand rates from Mapleton, Penn., to Olean, N. Y., for statutory period prior to June 19, 1933, held unreasonable to the extent it exceeded \$2.20 a net ton.

23823. Plaster board. Gypsum Association et al. vs. Atchison, Topeka and Santa Fe Railway et al. (also a sub-number: 17006—Upson Co. vs. Ann Arbor Railroad, et al.) By the commission. Prior prescribed rates modified to exclude rates from Southard, Okla., and Sweetwater, Tex., to points in western trunk line territory. Further modification detailed.

3973. Cement. By division 3. Proposed cement rate in straight or mixed carloads from El Paso, Tex., to Alvarado, Valmont, Alamogordo and Tularosa, N. Mex., and decreases from El Paso to Newman, Cloudcroft, Three Rivers, Carrizozo, Capitan, Tecolote, and Corona, N. Mex., found not justified, without prejudice to the filing of rates based on denied contentions.

13071. Lime. Fourth section. By division 2. Central territory railroads authorized to establish and maintain lime rates from central territory points and from Buffalo, N. Y., to destinations in that territory over circuitous routes, without regard to the long and short haul part of the fourth section, but subject to the 50 and 70 per cent circuitry limitations.

25156. Concrete aggregate. Basic Dolomite Inc., et al. vs. Ann Arbor, et al. By division 3. Complaint dismissed. Michigan intrastate rates on concrete aggregate held not unlawful. Repetition was given to rule that mere existence of disparity between intrastate and interstate is not sufficient to warrant finding of undue prejudice.

25922. Sand and gravel. Capital Construction Co. vs. Chicago, Burlington & Quincy Railroad Co. By division 4. Complaint dismissed. Carload rates from Oreapolis, Neb., to Afton and Thayer, Ia., found not unreasonable.

26034. Sand and gravel. C. F. Lytle Construction Co. vs. Chicago, Rock Island & Pacific Railway Co. By division 5. Complaint dismissed. Carload rates from Louisville, Neb., to Atlantic and Lorah, Ia., not shown to have been or to be unreasonable.

15295. Cement. Fourth Section: By division 2. Conditional authority granted to establish and maintain rates on portland or hydraulic cement in carloads from Hannibal and St. Louis, Mo., and East St. Louis, Illinois, to Dewey, Okla., without observing the fourth section long and short haul provision.

25346. Lime. Pittsburgh Generator Co., Inc., vs. B. & O. et al. By division 3. Carload shipments of lime from Capon Road (Oranda), Va., to McKeesport, Penn., held subject to commodity rate maintained on common lime, hydrated, quick, or slaked. Rate of 15.5 cents found applicable, and rate of 9.5 cents held inapplicable.

Proposed I. C. C. Decision

26421. Cement. Dewey Portland Cement Co. vs. I.-G. N. et al. By examiner T. K. Carpenter. Rates from Dewey, Okla., to

Kilgore, Mart, Arp., Burkburnett, Waco, and Overton, Tex., and from Fredonia, Kan., to Waco, recommended as unreasonable to the extent they exceeded 21.5 cents to Kilgore, Arp, Waco, and Overton; 22.5 cents to Mart; and 24 cents to Burkburnett, on shipments delivered between March 14 and Sept. 10, 1932. Reparation recommended.

Gravel Rates Cut

DURING THE THIRD WEEK in July the Arkansas Corporation Commission authorized the Missouri-Pacific Railroad Co. to put into effect, on one day's notice, a reduced rate on gravel shipments from Newport to McCrory, Kan., where a highway construction job was in progress.

The new rate is 62 cents a ton, which enables Newport gravel pit operators to compete with truck competition from roadside pits.

Southern Producers Ask Cut

REPRESENTATIVES of the Mississippi Sand and Gravel Association met in Meridian July 26 to confer with railroad and state chamber of commerce officials whom they asked for help in securing reduced rates on sand gravel. A decision is expected in September.

Sitting in conference were J. W. Fox, Jackson; J. R. McLeod and C. J. Crane, Memphis, Tenn.; H. V. Hutcheson, R. A. Chadwick, H. E. Quarles and T. T. Martin, Mobile; L. L. Aches, V. W. Kessler, Hattiesburg; A. G. Prague, New Orleans; A. L. Day, Meridian; C. E. Flowers, Atlanta, Ga.; and H. G. Gillis, Hattiesburg.

Crushed Stone

Cass County Quarries, Weeping Water, Neb., are reported to be active filling highway material contracts.

♦ ♦ ♦

Fosberg and Co., contractors, have opened up a basalt deposit in the North river country near Cosmopolis, Wash., and the product will be used for highway resurfacing.

♦ ♦ ♦

Virginia: State Department of Agriculture is attempting to interest the Soil Erosion Service of the U. S. Department of Agriculture in operating its portable limestone grinding plants under lease. This is to get around the law which prohibits the use of convict-made products by the NRA, the state's portable plants having been provided for convict operation.

♦ ♦ ♦

Oldest Quarry in America is said to be 8 miles east of Newark, Ohio, where flint was taken out by the Moundbuilders, a race which preceded the so-called American Indians.

♦ ♦ ♦

Wisconsin: The FERA is going into the business of producing agricultural limestone in competition with commercial quarry

operators on a large scale, if present plans are carried out. The federal government is financing the labor bill 100%, also half the cost of machinery rental, operators' wages and quarry site. The work will be under the supervision of the County Agricultural Committees. They will locate the projects to be reasonably convenient for the labor needed, and the demand for limestone.

Feldspar and Mica

North Carolina: L. L. Mallard, inspection engineer for state department of labor, reports greatly increased activity in the feldspar and mica industries. "The reason for this increased activity is the higher prices being paid for feldspar and mica as the result of the codes covering the ceramics industry," Mr. Mallard said. "For while these mines were getting only about \$2.50 a ton for feldspar in March, 1933, they are now getting from \$5 to \$7 a ton for this same feldspar. There also is an increased demand for mineral clay, used extensively in making china and porcelain ware, glass and all types of refractories. It is used very extensively in making all types of insulators for the electrical industry. Prices for mica also had been very low until the code prices went into effect. With these new prices, however, scrap mica is now selling for \$10 a ton and the better grades of sheet mica are bringing as much as \$5 a pound or \$10,000 a ton. This mica is used extensively in all branches of the electrical industry as well as in the automobile industry and there is a growing demand for all types of mica."

1935 Road Congress in Washington, D. C.

THE American Road Builders' Association will hold its 1935 convention and highway exhibit in Washington, January 8-11, it was announced recently by Captain H. C. Whitehurst, president of the association and director of highways of the District of Columbia. Convention headquarters will be at the Willard Hotel.

An adequate highway program based upon securing financial aid through federal and state sources, giving especial attention to the use of highway revenues for highway purposes and principally the non-diversion of the gasoline taxes and motor license revenues for purposes other than highway construction and maintenance will be the theme of the convention.

"In the past few years the diversion of highway revenues has reached alarming proportions and threatens to stagnate highway construction and maintenance, which in turn will result in a serious impediment to progress in our transportation system. More than \$100,000,000 of gasoline taxes were diverted in 1933 and it is estimated that another \$100,000,000 was lost by evasion," Captain Whitehurst says.

Cement Mill Accidents Show Alarming Increase

July Figures, Reported by Association, Should Set Mill Safety Committees in Action

MILL AND QUARRY accidents among member mills of the Portland Cement Association were more numerous during July than in any month since October, 1930.

There were two and a half times as many lost time accidents in July as in the same month a year ago; the July, 1934, total equalled the July five-year average; fatalities doubled over July a year ago.

The July accident analysis, which the Association mailed to its members last week, delivered a stunning blow to safety groups and workers throughout the industry. Some of the latter have been enjoying the limelight as industry's shining examples of men who had at last brought accidents under control. But the July accident reports show that some of the leading safety groups must humbly go to the foot of the list and prove that eternal vigilance is the price of safety as well as peace.

Faulty Supervision

Of the 34 lost time or more serious accidents suffered during July, a large proportion are attributable mainly to faulty supervision. Altogether too many can be put down as lack of job planning or instruction, which leads back to supervision. Never was careful instruction and supervision needed more than now, as this large sudden increase in the cement mill accident rate so plainly reveals.

A factor of considerable importance is said to be the shifting of employees necessary to "piece out" their time under the 36-hr. week arrangement adopted in cooperation with Government recovery measures. Under old working schedules a part of such an outbreak of accidents as was suffered during July probably would have been ascribed to long hours of labor. Of course, that is impossible under the present short hours of labor. But these accident figures do bring out the hazards encountered by present unusual operating conditions.

July Accidents

The following accidents occurred in the member plants of the Portland Cement Association during July:

1. **Cement Storage**—July 3, 3 p. m. Construction foreman, (42) length of service 6 days. (Began work 12 noon.) Was aiding in erection of vertical scaffold then completed to a height of 48 ft. Scaffold toppled over carrying injured with it. Injury: broken bones of foot, back and internal injuries causing death.
2. **Mechanical**—July 31. Carpenter, (41) length of service 7 years. Deceased, who was painting steel work on trestle over railroad tracks, lost balance and fell to the ground, about 50 ft., breaking his neck.
3. **Quarry**—July 7, 3 p. m. Laborer, (56). (Began work 7 a. m.) Dropped stone on in-step of right foot causing bruises.
4. **Quarry**—July 21, 7 a. m. Shovel operator, (45) length of service 15 years. (Began work 7 a. m.) Stepped on nail which punctured foot resulting in infection.
5. **Quarry**—July 21, 4:30 p. m. Shovel

operator, (47) length of service 15 years. (Began work 8 a. m.) Employed remained too near blast and was struck by flying stone, bruising back and cutting arm.

6. **Crushing Department**—July 14, 10 a. m. Machinist, (39) length of service 15 years. (Began work 7 a. m.) Employee was installing rotary screen sections. Screen standing on floor toppled on injured, fracturing right lower jaw.

7. **Raw Department**—July 4, 9 p. m. Mechanic's helper, (48) length of service 8 years. (Began work 6 p. m.) Injured was on top of slurry mixer wall when guard rail broke allowing him to fall to floor. Injury: Fracture of base of skull.

8. **Raw Department**—July 13, 10:45 p. m. Laborer, (76) length of service 15 years. (Began work 6 p. m.) While pulling cable to raw materials scales, cable broke and employee fell backwards, striking left shoulder and side. Injuries: Contusions of muscles around left shoulder, sprain of left shoulder, and fracture of 7th and 8th left ribs.

9. **Raw Department**—July 15, 9:20 a. m. Raw mill operator, (29) length of service 4½ years. (Began work 6 a. m.) Injured was removing piece of wood from feeder table. Hand became caught between wood and blade on the table. Injuries: Fracture of 5th metacarpal bone and proximal phalanx of little finger on right hand; marked displacement.

10. **Raw Department**—July 26, 3 p. m. Handyman, (4) length of service 10 years. (Began work 7 a. m.) Employee was pouring zinc around lining plates in raw mill when hot metal exploded, spraying over face, chest and back, causing 1st and 2nd degree burns.

11. **Burning Department**—July 20, 9 a. m. Construction man, (37) length of service 20 days. (Began work 7 a. m.) Employee was holding bucking bar while helping to drive rivets. Airhammer slipped off rivet; the hammer snap flew out of gun and glanced off channel iron, striking injured on head. Injuries: Contusion and laceration of scalp with fracture of vault of skull.

12. **Burning Department**—July 21. Laborer, (38) length of service 17 years. Employee stood before dust chamber door playing hose on dust collected at base of kiln stack. Dislodged dust fell in water in bottom of chamber and explosion occurred. Injury: 1st degree burns about legs and right side.

13. **Burning Department**—July 22, 10 a. m. Kiln feeder, (19) length of service 7 weeks. (Began work 7 a. m.) Employee's hand was drawn into gears while greasing latter with paddle. Injuries: 3d finger at 2nd joint, 2nd finger at 3d joint and index finger at 1st joint on left hand cut off.

14. **Finishing Department**—July 14, 9:50 a. m. Repairman, (50) length of service 17 years. (Began work 6 a. m.) Employee was working on tube mill clutch. He stood on plank one end of which rested on tube mill belt, the other on line shaft pier. End of plank slipped off and injured fell about 5 ft., landing astride an iron handrail. Injuries: Physical shock and severe injuries to genital organs.

15. **Finishing Department**—July 26, 3:15 p. m. Millwright, (44) length of service 5 years. (Began work 8 a. m.) Hit in face by iron ball, causing bruises.

16. **Finishing Department**—July 28, 11:30 a. m. Concrete finisher, (21) length of service 2 weeks. (Began work 8 a. m.) Splinter entered right thumb causing inflammation and infection.

17. **Coal Grinding**—July 10, 9:40 p. m. Coal shoveler, (35) length of service 5 years. (Began work 3 p. m.) Injured was prying out a door wedge on drop bottom car with iron bar when door flew open striking him over left eye and rendered him unconscious. Injury: Cerebral concussion and basal skull fracture.

18. **Cement Storage**—July 3, 3 p. m. Carpenter, (52) length of service 6 days. (Began work 12 noon.) Employee was aiding foreman mentioned in accident No. 1. When tower crashed he fell with it bruising arms and body.

19. **Packing and Shipping Department**—July 3, 2:30 p. m. Cement sack filler, (38) length of service 13 years. Was filling ce-

ment sacks when hot cement splashed over right shoulder and arm causing severe burns.

20. **Packing and Shipping Department**—July 9, 11 a. m. Binman, (49) length of service 29 years. (Began work 7 a. m.) While trying to break down a pile of cement inside cement bin, cement slide occurred throwing injured against wall. Handle of hoe with which he was working was rammed under his arm, lacerating right axilla.

21. **Packing and Shipping Department**—July 11, 3 p. m. Sweeper, (22) length of service 1½ months. (Began work 9:30 a. m.) While sweeping around packing machine, got hot cement dust in eye. Injury: Slight burn of external canthus of left eye.

22. **Packing and Shipping Department**—July 20, 11:30 p. m. Laborer, (39) length of service 3 weeks. (Began work 7 p. m.) Employee wrenched back when lifting bag of cement.

23. **Packing and Shipping Department**—July 25. Laborer, (34) length of service 10 years. Employee punctured sole of right foot with roofing nail when leaving the yard. Infection followed.

24. **Packing and Shipping Department**—July 25, 9 a. m. Laborer, (26) length of service 1 month. (Began work 7 a. m.) Sprained back while lifting T-rail.

25. **Packing and Shipping Department**—July 30, 5 p. m. Floorman, (44) length of service 7 years, was climbing on box car to release brake. He had grasped rung on top of car when hand slipped and injured fell to ground. Injuries: Compound fracture of both bones of lower left arm with dislocation at wrist; fracture and dislocation of left thigh.

26. **Packing and Shipping Department**—July 23, 10:30 a. m. Packer, (28) length of service 8 months. (Began work 9:30 a. m.) Small stream of cement shot from a hole in a bag and into his eye causing inflammation.

27. **Power**—July 5, 9:30 a. m. Carpenter, (38), length of service 11 years. (Began work 7 a. m.) Injured was putting top board on dam across creek when feet slipped, throwing jured to base of dam onto rocks. Injury: Fracture of right femur.

28. **Power Plant**—July 14, 10 a. m. Welder, (35) length of service 2 months. (Began work 8 a. m.) Injured was repairing leak in warm water well when stepped down too far and water entered his boot. Water was hotter than injured realized, causing acute burns about right foot.

29. **Yard**—July 27, 11:15 a. m. Truck driver, (20), length of service 3½ weeks. (Began work 7 a. m.) Injured was shoveling cinders into truck which had been placed too close to tracks. Switch engine shoved car into truck which in turn struck injured. Injuries: Contusions and abrasions over back, shoulders, forearms and chest, lacerated wounds on right knee and abrasions and contusions of left knee and face.

30. **Yard**—July 28, 8 a. m. Carpenter, (49), length of service 4 months. (Began work 7 a. m.) Fell off carload of lumber, causing fracture of the last segment of the sacrum.

31. **Yard**—July 30, 11 a. m. Laborer, (48), length of service 14 years. (Began work 7 a. m.) Roof of building was being painted. Employee was carrying bucket of hot asphalt on roof when his foot slipped. Asphalt spilled on his hands and wrists and splashed on chin, neck and chest, causing severe burns.

32. **Welding**—July 6. Welder, (39), length of service 2 months. Injured was cutting angle iron and while passing the bar over the face of a pulley which had been used for a bar rest, angle slipped off pulley, falling on left foot, causing severe contusions with ecchymosis.

33. **Incline Way**—July 6, 3 p. m. Helper, (42), length of service 13 years. (Began work 8 a. m.) Injured was working with others taking steel structural work and plates up incline way on hoist car. As the car approached landing, hoist operator noticed a piece of steel about to fall on the landing and stopped the hoist suddenly. This caused one of the men to fall off car, cracking several ribs.

34. **Shale Mine**—July 16. Laborer, (61), length of service 4 years. Employee was shoveling shale into a mine car when a piece broke loose from the rib and struck him a glancing blow on the head, knocking him down.

Geographical Location of Accidents

Alabama, two lost time, two mills; California, one lost time; Canada, three lost time, two mills; Illinois, one lost time; Indiana, two lost time, two mills; Iowa, four lost time, two mills; Michigan, two lost time, two mills; Missouri, one lost time; New York, one fatality, one lost time, one mill; Ohio, five lost time, two mills; Oklahoma, four lost time, one fatality, two mills; Pennsylvania, one lost time; Tennessee, one lost time; Texas, three lost time, two mills; Virginia, one lost time.

Lime Producers' Forum

Conducted by Victor J. Azbe,
Consulting Engineer, St. Louis, Mo.

The Lime Kiln Cooler—Its Design and Effect of Design Upon Lime Kiln Efficiency Capacity and Upon Lime Quality

LIME KILNS can not be of much account in terms of fuel efficiency unless the kiln cooler performs effectively, that is, exchanges, properly, sensible heat contained in the burned lime to air to be used in combustion. It is only those kilns having amply large coolers and using them effectively that have good fuel ratios. This is so certain that one may say with entire safety that a kiln is poor if lime drawn is hot; which means an ineffective cooler. No kiln from which hot lime is drawn is ever efficient.

In the past lime kilns were built often with no intention of utilizing the cooler, and when there was such intention the space assigned had no logical relation to the actual space necessary. The coolers ordinarily were shallow and of such arrangement that if air did pass through them it tended to slip up the kiln shaft center rather than mixing with combustible gases coming in through the burner ports. As a consequence, coolers frequently were sealed between draws and lime was drawn hot. Only in some of the best plants as at Milltown, Ind.; McCoy, Penn.; Berkley and Ivanhoe, Va.; St. Genevieve and Glen Park, Mo.; and some few others were lime kiln coolers used to full advantage; all of which was reflected in better fuel ratios and higher capacity.

In the case of mixed-feed kilns the cooler was, however, almost always effectively used. With these kilns so extensively used in Europe, and almost generally in the soda manufacturing industry in this country, the air is all admitted at the bottom and lime is drawn merely warm to the hand. The hot zone of these kilns is almost half-way up, or at least one-third up, the kiln height, and a third of the kiln may be considered the lime kiln cooler, or air pre-heater, whichever way one looks upon the thing. It is for this reason mainly that mixed-feed kilns are so efficient, and why in the soda indus-

try they are employed so generally as only efficient kilns having a high percentage of CO_2 in the gases coming off; and in the soda plants high CO_2 is wanted.

How large the cooler should be depends upon several matters; for one, Is the lime of high calcium or dolomitic variety? Is it well burned or is there much core? Is it pure or does it contain considerable impure matter? One would think that this had nothing to do with coolers, but actually it has a great deal, for it is what determines the amount of heat delivered in the cooler for exchange over to the air.

A kiln will produce more dolomitic than

high calcium lime, so the cooler should be larger. When the lime has core or impurities a great weight passes through the cooler, so again it must be larger. For kilns to be forced it should be larger also. In the case of kilns where most of the air will pass through the cooler, it need not be as large as when only a small quantity passes; which is peculiar, but explainable. Efficient kilns must have large coolers not just because they would be efficient with larger coolers, but because more lime passes through the cooler and there is more heat to be transferred over to the air.

Fig. 1, Graph A, gives the heat capacity of lime and limestone. It will be noted that due to the higher specific heat a pound of core will contain more heat than a pound of lime when both are at the same temperature. Graph B is based on this, and on the heat loss, if lime of different degree of completeness of burn is drawn hot. It will be noted that even if there is no core and lime drawn is reddish hot, which is about 1000 to 1200 deg. F., the heat loss is quite serious, and for every pound of CaO drawn, the kiln is deprived of heat sufficient to make 0.2 lb. additional lime. This means a loss of almost 20%.

Lime leaving the hot zone and entering cooler is at a temperature of about 2400 deg. F. When it is pure lime it will contain 535 B.t.u. of sensible heat above atmospheric temperature. As it will have some core we may say that the amount of heat carried downward will be 600 B.t.u. per pound of lime, and likely it may be more. Some of this heat is lost through the walls of the cooler, the balance can be regained in only two ways. One is part of this heat, that of high temperature, that is above the dissociation temperature of CaCO_3 , may work on the core and accomplish some further conversion to CaO . Such as has no core to work on, or that is of low elevation, that is below the dissociation point of CaCO_3 (which point varies between 1450 and 1648 deg. F., depending upon the CO_2 concentration at the decomposing particle), can be utilized

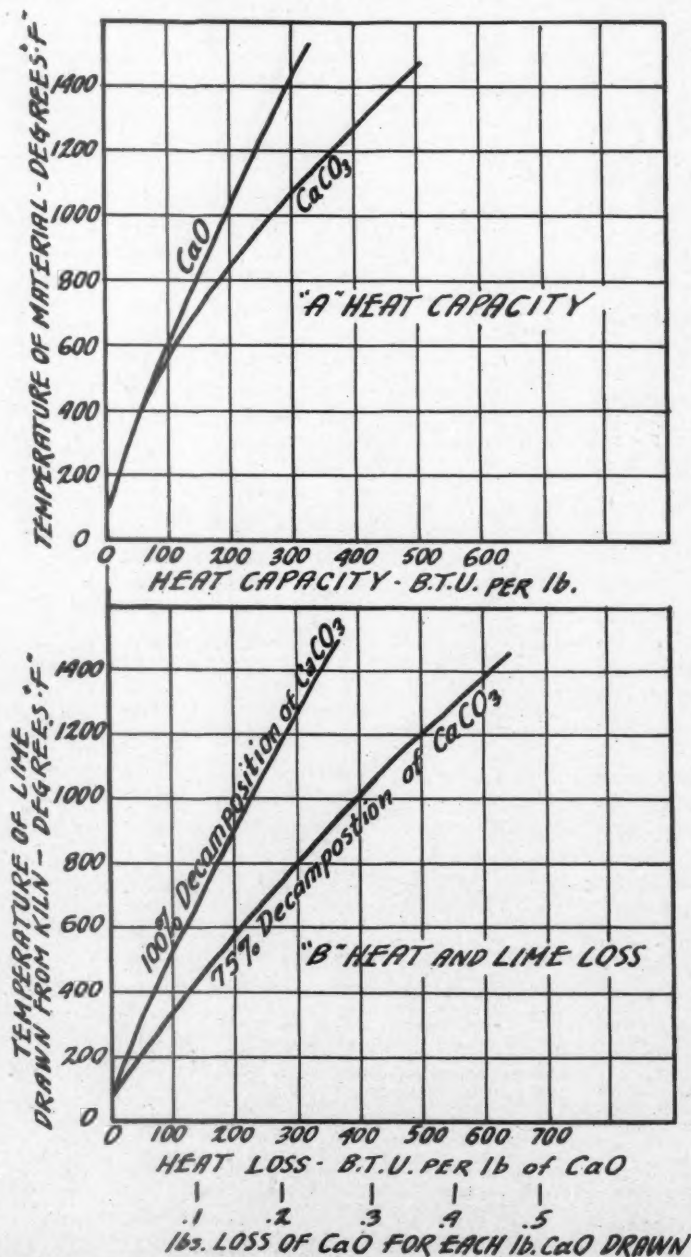


Fig. 1—Heat capacity and heat loss graphs

only by the preheating of the air for combustion. If none is regained by one means or the other, if all is lost, the loss means the same as a loss of 0.435 lb. of CaO as 1378 B.t.u. are necessary to dissociate sufficient CaCO_3 to make one pound of CaO. Instead of the ideal of 1378 B.t.u., which is the latent heat in the lime, it carries out the additional sensible heat of 600 B.t.u., or a total of 1978 B.t.u.. This means that lime kiln capacity drops proportionately and that fuel efficiency is equally lowered to the theoretical extent of 43%. Practically the preventable loss is not quite so great because some heat is always lost through the cooler walls and lime never is cooled quite to atmospheric temperature, but certainly the difference between an effective cooler and ineffective cooler is at least 33% in efficiency and in capacity. The capacity can be made up, of course, by forcing the kiln more, but there is no remedy for loss in thermal efficiency. In special cases, where lime is magnesian, due to the higher specific heat of magnesium oxide than of calcium oxide, or when lime is impure to a considerable extent, or when there is much core, it is quite possible that fuel consumption with a fully ineffective cooler may be 50% more than when the cooler is effective to a practical extent.

In a later issue I will discuss the design of coolers.

New Head of U. S. Bureau of Mines

AFTER having his appointment held up for two months by the Postmaster General, Prof. John Wellington Finch, formerly dean of the University of Idaho Mining School, has taken office as director of the U. S. Bureau of Mines. Professor Finch arrived in Washington the day after the President sailed for Hawaii, only to have his appointment held up with this note at the bottom of the commission "Held up temporarily because of political objections by P. M. G."

Since Mr. Roosevelt's return the political doubts of Postmaster General Farley were set at rest and the appointment went through. The post pays \$8,000 a year. The Bureau of Mines, formerly under the Commerce Department, was transferred to the Interior Department after Mr. Ickes took charge.

Scott Turner, former director, has opened an office in the Otis building, Washington, D. C., as a consulting mining engineer.

Cement

Missouri Portland Cement Co., Independence, Mo.: An aftermath of the publicity given the office cooling system, of pumping cool air from the limestone mine, is the barricading of one of the mine entrances near a highway because visitors desiring to cool off became a nuisance, and it was necessary to employ watchmen to handle the crowds.

Statistics: The portland cement industry in July, 1934, produced 8,134,000 bbl., shipped 7,893,000 bbl. from the mills, and had in stock at the end of the month 21,842,000 bbl. Production in July showed a decrease of 5.5% and shipments a decrease of 9.2%, as compared with July, 1933. Portland cement stocks at mills were 10.0% higher than a year ago. The mill value of the shipments—35,163,000 bbl.—in the first half of 1934, is estimated as \$53,602,000. In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 163 plants at the close of July, 1934, and of 164 plants at the close of July, 1933:

RATIO (PER CENT) OF PRODUCTION TO CAPACITY.

	July, 1933	June, 1934	May, 1934	Apr., 1934
The month ended	37.6	35.7	39.8	37.5
The 12 months ended	26.3	26.9	27.1	26.7

The following table shows shipments of portland cement from domestic mills in the first six months of 1934 arranged by states, so far as permissible, and by districts. The quantities are summarized from monthly reports of the producers received by the Bureau of Mines from all but one plant in May; three in February; and two in the other months of the period; estimates have been included for these plants. The values (f. o. b. at the mills) are based on estimates of the producers supplemented by estimates by the Bureau of Mines for two plants for the first quarter of the year; for six plants for the second quarter. They do not include the price of containers nor do they include cash discounts where allowed. The values may be higher for certain states where some special cements have been reported by the producers in addition to the ordinary structural cement.

PORTLAND CEMENT SHIPPED FROM MILLS IN THE UNITED STATES IN FIRST SIX MONTHS OF 1934, WITH ESTIMATED MILL VALUE, BY STATES AND DISTRICTS. (QUANTITIES IN THOUSANDS OF BARRELS.)

State	January through March		April through June		First six months	
	Quantity ¹	Estimated mill value	Quantity ¹	Estimated mill value	No. of shipping plants	Quantity ¹ mill value
Alabama	586	\$ 804,000	547	\$ 773,000	6	1,133 \$ 1,577,000
California	2,162	3,171,000	2,392	3,337,000	10	4,554 6,508,000
Illinois	230	397,000	1,260	1,791,000	4	1,540 2,188,000
Iowa	245	365,000	1,179	1,820,000	5	1,424 2,185,000
Kansas	497	769,000	858	1,311,000	6	1,355 2,080,000
Michigan	446	616,000	1,351	1,910,000	10	1,797 2,526,000
Missouri	438	635,000	1,239	1,768,000	5	1,677 2,403,000
New York	355	509,000	1,548	2,417,000	10	1,833 2,926,000
Ohio	360	534,000	1,328	1,950,000	10	1,688 2,484,000
Pennsylvania	1,637	2,325,000	4,722	6,979,000	25	6,359 9,304,000
Tennessee	446	707,000	616	999,000	6	1,062 1,706,000
Texas	883	1,556,000	1,011	1,780,000	9	1,894 3,336,000
Other States ²	3,033	4,985,000	5,764	9,394,000	44	8,797 14,379,000
	11,348	\$17,373,000	23,815	\$36,229,000	150	35,163 \$53,602,000
District						
E. Pa., N. J., and Md.	1,615	\$ 2,298,000	4,674	\$ 6,933,000	22	6,289 \$ 9,231,000
New York and Maine.	355	545,000	1,636	2,573,000	11	1,991 3,118,000
Ohio, W. Pa., and W. Va.	734	1,079,000	2,266	3,344,000	19	3,000 4,423,000
Michigan	446	616,000	1,351	1,910,000	10	1,797 2,526,000
Wis., Ill., Ind., and Ky.	807	1,186,000	2,983	4,355,000	11	3,790 5,541,000
Va., Tenn., Ala., Ga., Fla., and La.	1,792	2,728,000	1,890	2,974,000	18	3,682 5,702,000
E. Mo., Ia., Minn., and S. D.	739	1,088,000	2,579	3,833,000	11	3,318 4,921,000
W. Mo., Neb., Kan., Okla., and Ark.	1,033	1,624,000	1,985	3,129,000	12	3,018 4,753,000
Texas	883	1,556,000	1,011	1,780,000	9	1,894 3,336,000
Colo., Mont., Utah, Wyo., and Idaho	414	695,000	609	1,129,000	8	1,023 1,824,000
California	2,162	3,171,000	2,392	3,337,000	10	4,554 6,508,000
Oregon and Wash.	368	787,000	439	932,000	9	807 1,719,000
	11,348	\$17,373,000	23,815	\$36,229,000	150	35,163 \$53,602,000

¹Summarized from monthly reports of the producers.

²Includes Arkansas, Colorado, Florida, Georgia, Idaho, Indiana, Kentucky, Louisiana, Maine, Maryland, Minnesota, Montana, Nebraska, New Jersey, Oklahoma, Oregon, South Dakota, Utah, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

Tennessee Valley Authority, Knoxville, Tenn., announced August 7 that it is having a study made to ascertain if the price of cement is too high in the United States. If it is, the announcement says, it will build its own cement plant for Norris dam. So far the TVA has bought only a small part of the cement it will use in construction of the \$34,000,000 power dam.

◆ ◆ ◆

Cement Institute is attempting to educate the layman that uniform prices for cement are fair and the natural result of competition in a basic, standard commodity. As mentioned in ROCK PRODUCTS, August, p. 61, full-page advertisements are being carried in construction, industrial and some popular media. The success of this effort will be watched with interest for it is out of the ordinary line of prestige advertising.

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Crushed Stone

Maryland: State Roads Commission is considering establishing its own quarry and crushing plant in Montgomery County. Owners of existing commercial plants representing an investment of several million dollars will protest vigorously.

◆ ◆ ◆

General Crushed Stone Co., Oaks Corners, N. Y., has completed a plant for the manufacture of a cold bituminous mixture for highway surfacing and resurfacing. A district office has been opened in the Geneva Trust Co. building, Geneva, N. Y., in charge of B. E. Rex, of the Easton, Penn., office.

◆ ◆ ◆

Dolese Brothers, Chicago, Ill., and **Oklahoma City, Okla.,** have purchased the quarry and crushing plant of C. E. Van Orman at Hartshorne, Okla.

Further Developments in Grinding

Data Accumulated at Whitehall Cement Manufacturing Co.
Prove Flexibility of Original Experimental Installation

By Nathan C. Rockwood,
Editor, Rock Products

BEGINNING with an article in the issue of May 21, 1932, by Earl C. Harsh, associate editor, ROCK PRODUCTS has followed the installation of and experience with a new grinding unit at the plant of the Whitehall Cement Manufacturing Co., Cementon, Penn., because this installation promised savings and results in grinding in which not only the cement industry, but practically all the rock products industries, are greatly interested. With the active interest and support of the Whitehall company, and because of the flexibility of the installation, as well as of the machine itself, experiments and the constant accumulation of new data have proceeded almost continuously for over two years; and the writer has recently obtained permission of the principals, the cement company and the manufacturer of the grinding unit, the Babcock & Wilcox Co., to release some of these more recent data for publication. The first article on operating results, entitled "Possible Grinding Economies Would Save 25% in Power Cost of Portland Cement," by the present writer, was published in the April, 1933, issue, and the article herewith is a continuation, based on these subsequent data.

Process Investigated

Data were sought on the following, although not in the sequence mentioned. (In this particular installation it is easy to switch the mill from raw to finish grinding or vice versa.):

- (1) Preliminary grinding of raw material;
- (2) Complete grinding of raw material;
- (3) Pulverizing cement clinker to 90% through 200-mesh;
- (4) Pulverizing cement clinker to a high degree of fineness.

(1) *Preliminary Grinding of Raw Materials.*—The accompanying data (Table 1) are typical of results obtained in day-in and day-out operation, where a fineness of approximately 67 to 70% through 200-mesh was produced. Actual duplication of fractions produced by the other preliminary grinders were not possible on account limitations in transporting equipment from the B&W unit.

Three test records are shown. The cement rock feed was a hammer-mill product, up to 1½-in. ring size with occasional pieces running larger. No daily tests were made for the grindability factor of this rock (see ROCK PRODUCTS, April, 1933), but it may be reasonably assumed that this was approximately 75, and therefore is directly

comparable with the data presented on complete pulverization in the same unit. Attention is directed to the fact that there is practically no difference in temperature as between material fed to the pulverizer and the delivered product. (In another cement plant operation red hot flue dust in substantial quantity has been introduced into the same kind of system with no appreciable effect on operation, it is said.)

TABLE 1—TEST DATA ON WHITEHALL CEMENT PLANT INSTALLATION

A No. 360 B. and W. pulverizer with 16 ft. Sturtevant separator used as a preliminary grinder on raw material (cement rock).

Duration of test	9 hours	12 hours	12 hours
Production—tons/hour ..	49.5	51.6	50
bbl./hour ...	165.3	172	165.8
Kwh. ton—for pulverizer ..	6.70	6.40	6.73
for elevator and separator	1.38	1.39	1.36
Total power..	8.08	7.79	8.09
Fineness, % through 200-mesh	68.4	67	68.69
Circulating load	3.30	3.30	4.00
Circulating load, tons/hour	163	170	200
Temperatures:			
Feed, deg. F.	90 to 145	115 to 176	110 to 160
Mill discharge	126 to 189	155 to 225	115 to 162
Tails	155 to 207	130 to 180	115 to 165
Finished product	160 to 186	138 to 180	115 to 180

TABLE 2—TEST DATA ON WHITEHALL CEMENT PLANT INSTALLATION

Duration of Test	23.00 hours	5.75 hours	10.83 hours
Production: tons/hour	35.22	37.48	41.66
bbl./hour	117.39	124.90	138.87
Kwh. ton—for pulverizer...	7.47	7.43	7.89
for elevator and separator	1.55	1.44	1.96
Total power.....	9.02	8.87	9.85
Fineness, % through 200-mesh	90.87	90.50	89.40
Circulating load—ratio to feed....	6.72	5.96	7.87
tons/hour	236.67	223.38	327.87
Temperatures:			
Feed, deg. F....	128	137	154
Mill discharge...	168	170	197
Tailings	163	166	174
Finished product...	158	159	179

Note.—These tests at various outputs are shown to indicate that on Lehigh Valley Cement Rock the best power results were obtained at 37.48 tons per hour.

(2) *Complete Pulverizing of Raw Material in One Unit.*—In the test data presented in Table 2 are three typical days' operation. The character and size of feed was the same as in Table 1, and the aimed for fineness was 90% through 200-mesh. The only change made in this equipment as between operation to produce results shown in Tables 1 and 2 was in the blades of the 16-ft. separator. A comparison of these data shows that for the expenditure of approximately 2.0 kw.h. per ton additional the fineness of the product was increased from 70% through 200-mesh to 90%. It would therefore seem that the known economies of stage grinding are possible in a single unit where, as in this case, the product is removed as fast as it reaches the desired degree of fineness.

There appears to be one direction that tests have not as yet been given, namely, what may be expected from this machine if it receives prepared feed of 4-, 10-, or 20-mesh. It is hoped that sooner or later the manufacturers or others will find it possible to run this to a conclusion, but it appears that thus far the material-flow of users has not permitted that kind of demonstration.

(3) *Pulverizing Cement Clinker to 90% Through 200-Mesh.*—The data in Table 3 represent three typical days' operation, out of a total production of 300,000 bbl. In this period there was considerable variation as between new and storage clinker proportions, and for that reason there have been selected days that show changes of temperature of the entering feed. There was no attempt made during these routine operations to obtain the comparative grindabilities of the clinker being pulverized, and in these tabulations it is not intended that any variations of rate of production are reflections of variation in temperature of feed.

Attention, however, is directed to the temperature records. While the manufacturers of this equipment had no objective other than general information when installing the temperature measuring equipment, these data have created almost as much interest in the industry as the performance records pertaining to power, capacity, and fineness. It is well known that an increasingly large number of cement manufacturers have been obliged to resort to water-spraying of grinding mills to eliminate ball coating, to prevent converting the gypsum to anhydrite, and to deliver a product to silos at as near shippable temperature as possible. Reasons for the lower temperatures obtaining throughout

in this unit were pointed out in the previous article, and mention need only be made of the fact that the material being pulverized is in the mill only momentarily (on account of the high circulating load) and the pulverizer and elevator and separator have substantial radiation surfaces.

In those states where taxes are imposed on inventory—and high inventories have to be carried in silos so as to have available ample shippable stocks, the low temperatures of the mill product may have considerable interest.

The feed in the data shown in Table 3 was run-of-kiln clinker with no intermediate reduction.

TABLE 3—TEST DATA ON WHITEHALL CEMENT PLANT INSTALLATION

Duration of test	23.67 hours	13.18 hours	23.03 hours
Production—bbl./hour	84.22	96.00	103.05
K.w.h. bbl., for pulverizer	3.59	3.64	3.32
for elevator and separator .....	.82	.69	.61
Total power	4.41	4.33	3.93
Fineness, % through 200-mesh	91.9	89.5	89.5
Circulating load	18.5	12.8	9.0
Circulating load—bbl./hour	1558.0	1228.0	927.0
Temperatures:			
Feed, deg. F.	129	176	168
Mill discharge	210	269	268
Tailings	187	226	249
Finished product	186	171	187

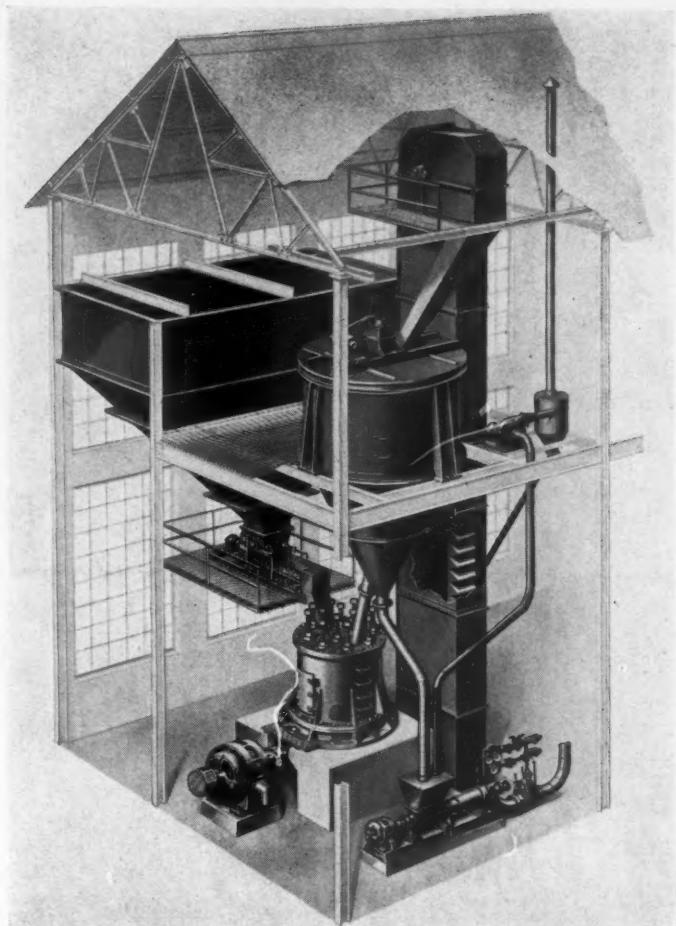
(4) *Pulverizing Cement to a High Degree of Fineness*—Up to the time of these tests no attempts had been made to weigh the mill's possibilities insofar as grinding special cements were concerned. It was felt that fine grinding and chemistry were inseparable in the manufacture of these special cements, and the manufacturer was content with the knowledge that his equipment produced as much as or more of the needed micron material than was common in the tubemill type, and that when called upon to do so there was sufficient flexibility in the unit to meet special requirements. An increasing number of requests for actual data, as well as curiosity on the part of the owners of the cement plant, caused four tests to be run.

When running these tests no adjustments or changes were made, other than in separator blades. Fineness only was aimed for.

TABLE 4.—TEST DATA ON WHITEHALL CEMENT PLANT INSTALLATION

Duration of test (hours)	11.83	11.83	11.83	11.75
Production—bbl./hour	68.50	70.86	66.39	64.16
K.w.h. bbl.:				
For pulverizer	4.45	4.46	4.83	4.78
For elevator and separator .....	.97	.79	.89	1.18
Total Power	5.42	5.25	5.72	5.96
Fineness, % through 200-mesh	93.80	95.70	96.50	98.30
Fineness, % through 325-mesh	91.50	89.00	94.00	96.00
Circulating load:				
Ratio to feed	23.0	19.6	22.9	21.2
Bbl./hour	1575.0	1388.8	1520.3	1360.1
Temperature:				
Feed—deg. F.	127	136	128	99
Mill discharge	237	230	234	219
Tailings	224	216	222	208
Finished product	176	180	183	176

Perspective drawing showing the arrangement of equipment in a closed circuit system



It is reasonable to assume that if maximum efficiency, or more or less specific surface, or other objectives had been included, changes could have been made in rate of flow through mill and in spring pressure to accomplish these objectives. It is hoped that in due course a series of tests can be undertaken that will show the possibilities along these lines, for obviously the results would be of much interest to our readers.

It is of interest to note that when changing from 93.8 to 98.3% through 200-mesh the capacity change was only $4\frac{1}{4}$ bbl. per hour or about 7%, and that less than 6 kw.h. per bbl. was used in these higher ranges. This becomes increasingly important where plants are now required to double grind the product to make the superfine cements.

The micron content results shown in Fig.

1 are Wagner turbidimeter determinations.

Acknowledgments

The writer acknowledges his indebtedness to Vice-President A. Hoke of the Whitehall Cement Manufacturing Co., for assistance in making the data given in this article available for publication, and for checking and

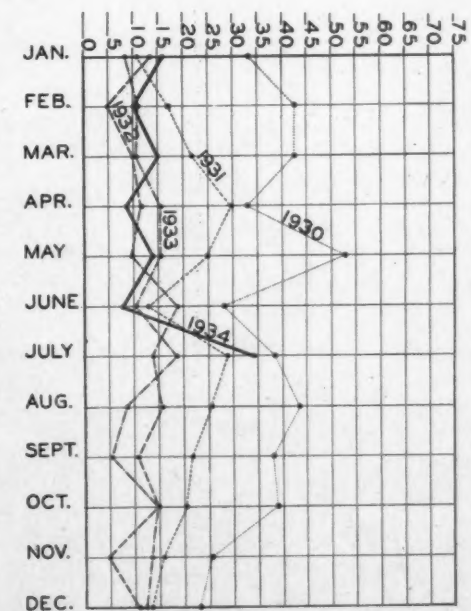


Fig. 1—Comparison of tests showing micron sizes of cement clinker

verifying them; he also is indebted to the Babcock & Wilcox Co. for similar aid and assistance.

Installations on Other Products

Since the original installation at the Whitehall cement plant the Babcock & Wilcox Co. has made installations to grind quick lime, gypsum, phosphate rock and chrome ore. The grinding of lime and chrome ore was done in the same mill in process work requiring the switching from one material to the other some 8 to 12 times per day. It would be difficult to imagine two more dissimilar materials from standpoint of specific gravity and grindability. It is also necessary that the system be completely cleared of one material before the second enters. This is being quickly and satisfactorily accomplished. The only change in equipment is an external handling of separator vanes.

Phosphate Rock: An installation in Georgia is said to be producing approximately 9 tons per hour of a fineness of 95% through 100-mesh. This mill has only two sets of races, and of only 32-in. pitch diameter. Florida pebble rock of hard grindability is processed. The installation has been operating almost a year without interruption, and without replacement of any wearing elements, it is said. The final figures on production, power and maintenance are in process of compilation, and will be reported later.

Gypsum: In the regrinding of calcined gypsum for increase of plasticity, there is involved more than a mere production of increased surface. Tests by leading gypsum companies over many years as well as research by the U. S. Bureau of Standards indicated that such plasticity was inseparably tied in with moisture disassociation and combination, pressures, etc. It has been agreed that such grinding produces micron sizes, but their quantity and form have not standardized. The tubemill has generally been employed in this work.

A Michigan producer became interested in the possibilities of the B&W pulverizer, and results in quality, it is claimed, have been most satisfactory, the mill operating 24 hours per day. There still remain to be determined the relative merits from single race, double, triple or quadruple race operation. Interesting data are being collected to be released to readers of *Rock Products* in due course.

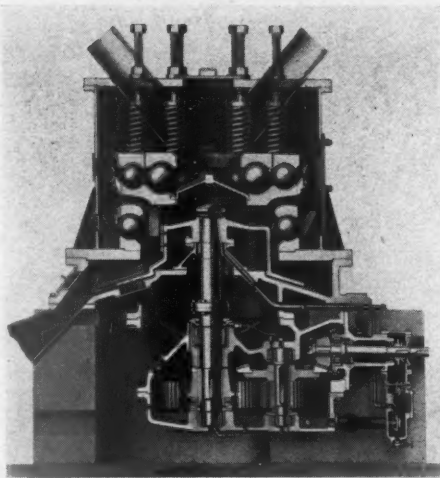
Mill Improvements

The mill itself has been undergoing some changes in design, mainly to render adjustments easier and to simplify its construction. The accompanying illustrations show the latest types.

Open Letter to the Ready-Mixed Concrete Industry

By H. F. Thomson, President

THE National Ready Mixed Concrete Association was organized early in 1930 and has functioned actively on behalf of the



Above: Type B pulverizer as now built.

Below: Grinding element of pulverizer



industry for more than four years. The Association was formed because of the well-crystallized feeling among leading ready-mixed concrete manufacturers that there was a distinct need for a trade organization to represent the common welfare of those engaged in the industry. It was believed, and that belief has been substantiated by events, that an exchange of ideas upon technical and commercial problems in our field, and a central agency to facilitate such exchange and to carry out the ideas developed, would be of mutual benefit to all members of the industry.

The Association has well justified its existence, and directly or indirectly, has been of tangible benefit to every manufacturer of ready-mixed concrete without respect to membership. The growing acceptance of ready-mixed concrete as a desirable method of handling all types of construction, large and small, has been accelerated materially by the Association's work. Conventions of the industry have afforded a means for exchanging ideas and developing policies; publications of the Association have disseminated knowledge relative to ready-mixed concrete which has been of value to both producers and consumers, and have led to

a more ready acceptance by the consumer; contacts with committees of various technical societies have rationalized specifications as regards ready-mixed concrete; and the Association has been chiefly responsible for the development of the Code of Fair Competition for the industry.

Although it has always represented the joint interests of all ready-mixed concrete manufacturers, the Association, thus far, has been supported financially by only a small number of the total operators in the country; this small number, however, representing a substantial portion of the total production. In addition to ready-mixed concrete manufacturers, the Association has received support from its associate membership, comprised of equipment manufacturers and the trade press.

That the membership of the Association is relatively small may be attributed largely to two factors—the marked decline in business activities just as the Association was getting started, and the local character of each manufacturer's business which has caused many to fail to realize the need for a national organization.

The officers of the Association feel that the time has now arrived for general participation in the National Ready Mixed Concrete Association by all members of the industry. While Code activities are now, and will continue to be, of outstanding importance, they cannot be considered as replacing the normal activities of a trade association. The function of such organization is to foster the technical development of the industry and to promote its products. Work along these lines is needed now more than ever before. With the tangible increase in construction activities, the need for the development of technical knowledge and the promotion of ready-mixed concrete becomes more and more apparent.

Realizing the added burden of expense on members of the industry incident to the administration of the Code, the Board of Directors of the Association now proposes a radical reorganization in the methods of carrying on its activities and in the assessment of membership dues. The Board of Directors has arrived at the conclusion that, under present circumstances, the industry is not prepared to support a paid executive staff.

Accordingly, membership dues, which have heretofore ranged from \$50 to \$300 per year, depending on the volume of production, have been reduced, effective July 1 of this year, to the nominal basis of \$15 per year for each company. This amount will permit of the distribution of information, contacts with technical committees, the holding of annual meetings, and many other activities. Since these funds are not sufficient to support an executive staff, it is now proposed that the Association will function primarily through voluntary committees, and, within a short time, we shall state specifically our plans in that regard.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

TVA Floating Concrete-Mixing Plants for Wheeler Dam

THE FLOATING ready-mixed concrete plants designed and built by the engineers of the Tennessee Valley Authority for making and placing concrete for the Wheeler dam, power house and locks on the Tennessee River near Florence, Ala., are probably more curiosities than practical demonstrations for commercial ready-mixed concrete producers. Nevertheless commercial producers are doubtless interested in the type of equipment chosen for them.

The contract for the sand and gravel aggregates was let to the Cumberland Sand and Gravel Co., Nashville, Tenn., in May. The amount required is between 1,000,000 and 1,250,000 tons, and the contract price is 89½¢. per ton delivered on the job (see *Rock Products*, June, 1934). The aggregates will be dredged, washed and screened from a site on the river below Sheffield, near Muscle Shoals, and will be moved up the Tennessee River through locks to Lake Wilson above the Wilson dam and thence to the Wheeler dam site. The aggregate contractor will operate 30 barges in this service.

The 500,000 cu. yd. of concrete, which will be required, will be mixed by floating

equipment. Four welded-steel barges for that purpose have been built for the TVA by the Ingalls Iron Works Co. of Birmingham and Decatur, Ala. Each is 40x90 ft. in plan and has a draft of 5½ ft. when loaded to capacity. Principal equipment of each barge consists of a Davis 2-cu. yd. electrically driven mixer, Blaw-Knox bins and batchers, and an American Hoist and Derrick Co. 75-ft.-boom revolving crane. These cranes will handle the concrete in 2-cu. yd. buckets into the cofferdams, of which five will be required to span the river. In the first cofferdam, site of the power house section, which is 800 ft. long and 170 ft. wide, it will be necessary to rehandle the concrete into the forms. This will be done by six Clyde revolving hoists with 95-ft. booms and mounted on rails.

Cement Products

Pittsburgh, Penn.: City Public Works Department, peeved by uniformity of bids on ready-mixed concrete, announces it will build its own plant at an estimated cost of \$45,000. It is estimated the city can make its own ready-mixed concrete for from \$7.80 to \$8.70 per cu. yd.

West Virginia: State Health Department and State Relief Administration have

standardized on a concrete base type of construction for sanitary toilets or privies. The unit cost has been reduced from about \$20 to approximately \$15 by using concrete and building toilets in quantities.

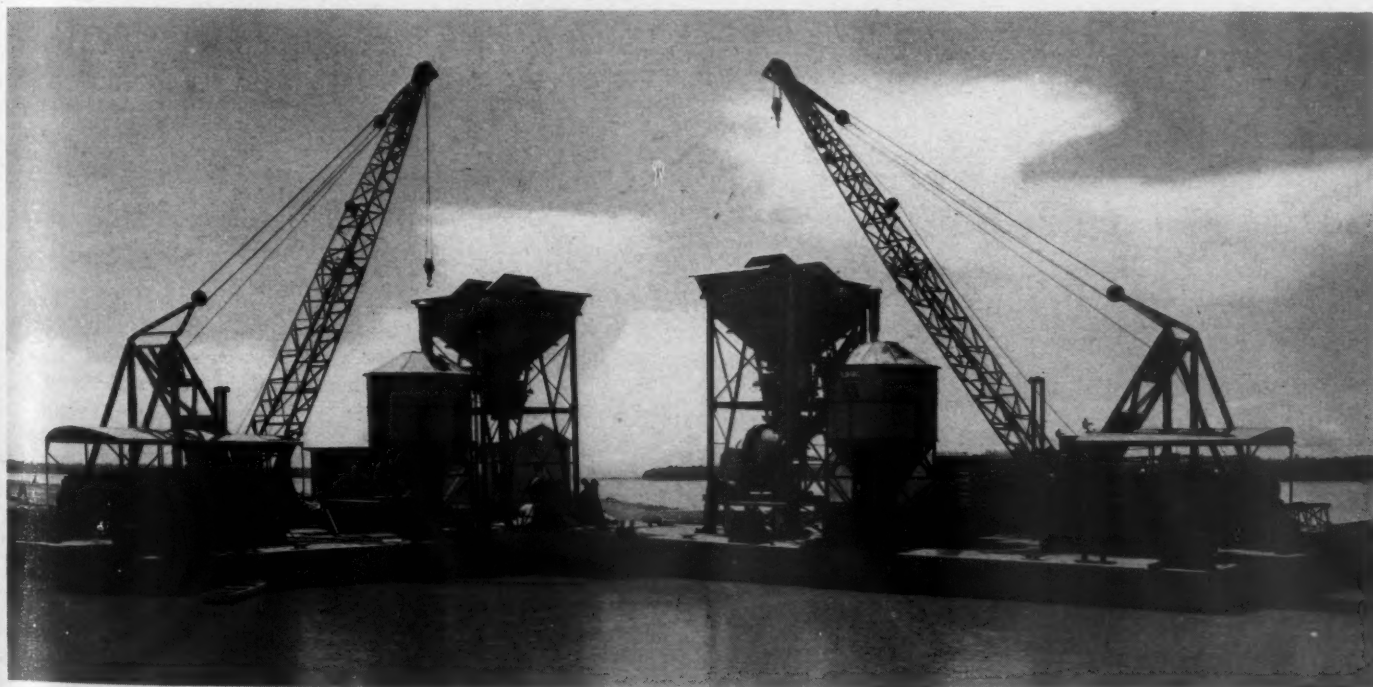
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Thoen Construction Systems, Inc., Memphis, Tenn., has developed a new pre-fabricated type of reinforced-concrete building construction. The company, which is newly incorporated, will also specialize in precast concrete piling, hand rails for bridges, etc.

Budget for Concrete Masonry Industry Approved

ADMINISTRATOR Hugh S. Johnson of NRA, has approved a budget of \$36,500 for 1934 for the support of code administration in the concrete masonry industry. The basis of assessment is figured at one-half of one per cent of the total current gross yard or plant sales of industry products for the calendar year 1934, payable on a quarterly basis.

At the same time Deputy Administrator C. L. Hickling announced that all objections to the application for the termination of the exemption for members of the industry from Administrative Order "X-36," should be submitted to him.



Two of four floating concrete mixing plants to be used at Wheeler Dam near Florence, Ala.

Crushed Stone Association Directors Favor Continued Promotion

ANY CRUSHED STONE PRODUCERS who may have come to the conclusion that the Code Authority of the mineral aggregate industries was over-shadowing or replacing the need of a National Crushed Stone Association, would have been convinced otherwise had they attended the annual board of directors' meeting at Hot Springs, Va., August 16. Here it was brought out that the Association is in better financial condition than it has been in a long time, and its directors are practically unanimously of the opinion that its research and promotional work should be expanded.

Most of the meeting had to do with routine matters of finance and discussion of policy in specific instances, but it was developed that the Association had increased its roll of active members from 175 companies in January, 1934, to 198 at the present time. Most of the new member companies are small producers but their joining is proof of a general appreciation of trade association activity in addition to Code Authority activity.

Research

Describing briefly the continuation of research work, A. T. Goldbeck, director of the Bureau of Engineering of the Association, said in part:

"We have thought it highly desirable that we concentrate much of our effort on the bituminous type of road because of the great emphasis being placed on secondary highways at this time. Fortunately, we foresaw this trend some three or four years ago, at which time we built our circular testing track. Since this track has been in operation, it has been visited by a number of prominent highway engineers and they go away from our laboratory convinced that we have developed an extremely useful and practical tool for rapidly determining the necessary facts in connection with highway construction and, in particular, bituminous highways. We have described our track in a paper before the A. S. T. M. and in this paper are described briefly some of the investigations we have undertaken.

"We feel that we can lay a number of different sections in the track and within a few hours' time determine which of those sections will give the best service. We know of no other laboratory procedure which will accomplish this same purpose. In the meantime, three other tracks, very similar to ours, have now been constructed. With its use we have solved problems for the Virginia State Highway Department, incidentally, to the benefit of many of the crushed stone producers in that state. We are likewise co-operating with the District of Columbia in

the solution of one of their bituminous mix problems. It will be noted in the A. S. T. M. paper above referred to that the track has been used for a variety of different kinds of problems in highway construction and in previous reports it has been pointed out that as the result of our tests with this equipment, not only have specifications been favorably changed, but stone has actually been sold. The track has paid for itself many-fold.

"In addition to the tests noted in the A. S. T. M. paper, we have performed tests on bituminous mixtures for individual producers so that they might determine which of a number of mixtures should give the most durable results. In every instance they seem satisfied that the results coincide with what they would expect in service.

"The development of standard methods of tests is one of the functions of our laboratory. Some phase of this work is being done continuously and an investigation has just been completed on methods of test for so-called "bulk" specific gravity of coarse aggregate.

"The soundness of aggregate and of concrete is a problem of the highest importance to the crushed stone industry and it is one upon which we have been working for several years. An investigation has just been completed in an endeavor to show the relationship between aggregates of varying soundness and the soundness of concrete made with such aggregates. The results of this investigation are now being compiled.

"An investigation has been started to determine the effect of vibration on concrete, particularly on concrete made with stone sand. This investigation is being performed with the idea of extending the use of stone sand. Engineers object to stone sand in large part because they do not feel that sufficient workability is obtained in the concrete. By the use of vibration there will be no question of being able to place stone sand concrete with the greatest of ease.

"We are continuing work on the expansion and contraction of concrete. This work has some relation to the failure of concrete in service, often attributed to unsound stone. We have found that disintegration of concrete can take place merely through alternations of temperature when the concrete is moist. These investigations should be continued under other exposure conditions."

Informal Discussion of Code

Following the formal meeting of the board there was an informal discussion of the NRA code for the mineral aggregate industries, which consisted largely of questions

and answers. Both Otho M. Graves, chairman of the Code Authority, and V. P. Ahearn, executive secretary, were present to answer the questions. While it was obvious from the character of the discussion that there is much disappointment because faster progress has not been made, and because there have been so many changes of opinion and policy within the NRA, there still remains a lot of faith and hope in the ultimate success of NRA. Apparently no one of the directors was yet willing to abandon the code of the industry.

Directors Present

The following directors were present: Russell Rarey, Marble Cliff Quarries Co., Columbus, Ohio, president and chairman of the board; W. M. Andrews, Lake Erie Limestone Co., Youngstown, Ohio; C. C. Beam, Melvin, Ohio; W. P. Beinhorn, Trap Rock Co., St. Paul, Minn.; L. J. Boxley, W. W. Boxley and Co., Roanoke, Va.; F. T. Gucker, John T. Dyer Co., Norristown, Penn.; N. E. Kelb, Erie Stone Co., Indianapolis, Ind.; E. J. Krause, Columbia Quarry Co., St. Louis, Mo.; Thos. McCroskey, American Limestone Co., Knoxville, Tenn.; J. A. Rigg, Acme Limestone Co., Alderson, W. Va.; H. E. Rhodes, Franklin Limestone Co., Nashville, Tenn.; James Savage, Buffalo Crushed Stone Co., Buffalo, N. Y.; F. W. Schmidt, Jr., North Jersey Quarry Co., Morristown, N. J.; W. L. Spurborg, General Crushed Stone Co., Syracuse, N. Y.; Stirling Tomkins, New York Trap Rock Co., New York City; T. I. Weston, Weston and Brooker Co., Columbia, S. C.; A. L. Worthen, Connecticut Quarries Co., New Haven, Conn.; F. O. Wyse, Bucyrus-Erie Co., South Milwaukee, Wis.; L. W. Shugg, General Electric Co., Schenectady, N. Y.

Among the guests, in addition to Messrs. Graves and Ahearn, already mentioned, were A. T. Goldbeck and J. R. Boyd, of the Association staff; Col. W. W. Boxley, Roanoke, Va.; Mr. Simmons, of Weston and Brooker Co., and A. W. McLlenia, Acme Limestone Co., and the wives and families of some of the directors.

Publications Received

Geologic Map of the Appalachian Valley of Virginia with Explanatory Text. By Charles Butts. Virginia Geological Survey, Bulletin 42. All lime and crushed stone producers in the Valley of Virginia should have a copy of this report for it contains a great deal of interesting and valuable information on the limestones and dolomites of this locality.

♦ ♦ ♦

Investigations of Fuels and Fuel Testing; 1932; Department of Mines, Canada, No. 737. Contains interesting data on grindability investigations, with a description of apparatus for determining relative grindability of various coals.

New Machinery and Equipment

Sixteen Bales of Cotton for One Conveyor Belt

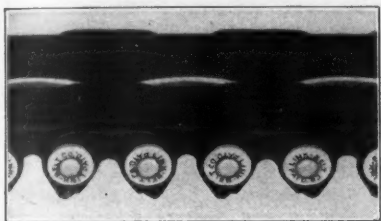
BUILT FOR A LIMESTONE PLANT, by the Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., a 1291-ft., single-piece rubber conveyor belt has been completed. It is 4 ft. wide.

In this belt, which is nearly a quarter of a mile long, are over 5000 sq. ft. of rubber material. It is 7x9 ply heavy duck construction with a 1/4-in. reinforcement on top and a 1/16-in. reinforcement on back.

Sixteen bales of raw cotton were used in making the belt. It weighs 11 tons. Its capacity, according to the company, is 1500 tons (136 times its own weight) of crushed limestone every hour.

Blue Chains

"NEW DRESS" has been given by Link-Belt Co. to a 32-year-old product, the chain drive. Most of the chain in the new "Silverstreak" units is given a blue-



Color for modernized chain

ing treatment, and the washers as well as guide bars are given a silver appearance.

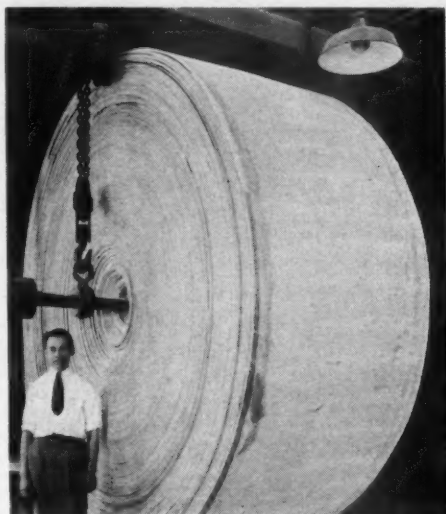
The bluing of the bulk of the chain has the effect of placing the silvery parts on a dark blue background, thereby emphasizing the silvery parts. The name "Silverstreak" has been adopted as a fitting designation, since when the drive is in operation the motion of the chain describes a silver streak. No claims for improved efficiency, strength, or durability are made.

Cooler Unit

A NEW DEVELOPMENT of the Elliott Co. is steam operated apparatus for producing cool water by means of flash or instantaneous evaporation under vacuum.

Recommended for industrial plants, it provides a means of supplying cool water for drinking purposes, for use in air coolers, for air conditioning cabinets, and for other applications where it is desirable to use water cooled to between 40 and 50 deg. Fahrenheit. It is a self-contained unit about 2 ft. in diameter and 6 ft. in height.

Within the tank is a low pressure evaporating compartment, steam jet compressor



Eleven tons of limestone-conveyor belt

and condenser. The exterior of the tank has one pump for removing and circulating the cooled water and another pump which removes condensing water. Low pressure steam at any available pressure above atmospheric pressure is admitted to the tank through an opening at the top. Water can be cooled and continuously admitted through the upper opening at the side of the tank into the low pressure compartment. There the pressure is maintained at 3/10 in. mercury. The entering water adjusts itself to the corresponding temperature of 45 deg., which is boiling point at that pressure.

New Battery Separator

VULCANIZED sheet rubber "honey-combed" with microscopic passages permitting free diffusion of the electrolyte: This is the new separator material, "Exide Mipor," with which all Exide-Ironclad Batteries now are equipped. The Electric Storage Battery Co. claims that passages through the rubber sheet are so small that the most



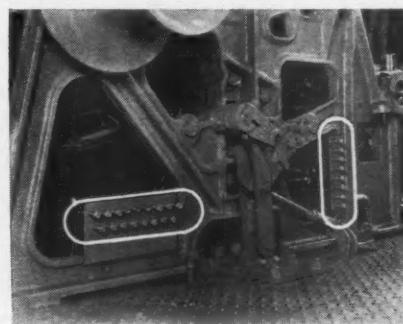
Sixty bags of cement, at 94 lb. each, is the capacity load of this General Motors "T-18" unit recently placed in service for a concern in Brooklyn, N. Y. Special equipment on the truck includes a 2-yd. body with 1-yd. extension side boards, and hydraulic hoist

minute of solid particles of active material are prevented from passing through.

Because they are vulcanized with heat during manufacture, the sheets are said to be immune to heat developed in the battery; they are not affected by the electrolyte solution. Exhaustive tests, says the company, show that the new compound lasts indefinitely, functions as a permanent electrical insulator and at the same time prevents complete diffusion of the electrolyte.

Centralized Lubrication

COMMENTING on improved lubrication systems for heavy equipment, D. B. Patterson, executive vice-president of Harnischfeger Corp., says: "We have found that the most effective way to overcome the difficulty of efficient lubrication on heavy units is the convenient grouping of Alemite nipples in a more accessible place. This not only reduces time required in necessary lubrica-



Grouping of lubrication nipples on heavy units

tion but insures a 100% job by taking the drudgery and the chance for negligence out of the work."

Certified Operators

Plant operators and contractors using P & H excavating and material handling equipment now are offered a new service by the Harnischfeger Corp. The company is maintaining a list of "certified operators," first requirement of whom is at least five years of actual experience in operating a P & H machine.

The list is made available to equipment users with the understanding that every operator listed has taken and successfully passed, with a grade of at least 80%, an examination covering practical operating questions, construction details and servicing of the machines. More than a year has been spent by the company in building up its original list. Character references and other qualifications of the operators have been carefully investigated.

A Maintenance Pointer

ROCK PRODUCTS OPERATORS may be interested in a recent field report concerning the experience of a rock drill company in the "running-in" of its pneumatic hammers. The concern in question states that prior to the introduction of colloidal-graphited oil for this operation, an average of seven out of 30 hammers were scored. Since introduction of this special oil agent, no trouble of this nature has been encountered, says the Acheson Oildag Co., maker of colloidal-graphite products.

New Regulator

A NEW SEALED TYPE mercury regulator which may be easily and accurately set, according to its sponsors, at a given operating temperature without resort to the trial and error methods required by other designs, is the latest addition to the line of the American Instrument Co.

To set this regulator, the bulb is immersed in liquid at the temperature at which the regulator is to be set. Time is allowed for the bulb to come to the required temperature level, and the surplus mercury then is spilled off into the side reservoir by tipping.

The company claims that the sensitivity of this device is plus or minus 0.01 deg. C. or better. The device is intended for use with an Aminco supersensitive relay or other relays that do not use more than 10 milliamperes operating current.

A Motor Record

DURING REVOLUTIONARY troubles at Central. Cespedes, Cuba, last year, men who took over the sugar mill would not permit water to be pumped out of pits in which were located three 150 hp. General Electric motors used to drive pumps. Later the motors were taken apart and dried out in an oven made around the muffler of a 150-hp. Diesel engine. The motor parts were dried three weeks before reassembly and revarnishing.

General Electric Co. reports that the motors ran the full crop season without any interruption or trouble. Another insulation test at the end of the run showed the same resistance of five megohms. Motors are said to have operated through 13 crops before this final test.

Thread Lubricant

OF interest to heavy duty machinery users is a new metallic lead thread lubricant, recently placed on the market by Armite Laboratories. It is claimed to be of value in assembling machinery and in repair of equipment subjected to heavy duty, high temperatures and general abuse.

The makers describe the product as being a very finely divided metallic lead in paste form, and claim that in use a file of me-

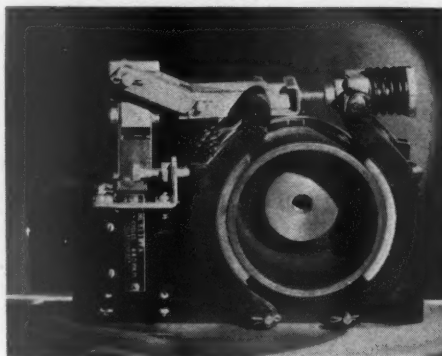
tallic lead is formed between the threads that prevents galling, speeds up repair work, and cuts costs.

The makers also claim this lubricant used on liners and fly-wheels facilitates their insertion or removal. All press work is improved by the use of this lubricant; even a bright red heat does not harden or destroy the compound in the threads, it is said, making it ideal for exhaust studs.

Electric Brakes

THREE NEW SIZES are included in the line of A. C. and D. C. solenoid operated brakes announced recently by Cutler-Hammer, Inc.: 3 lb. ft. to 75 lb. ft. These torque ratings are in accordance with NEMA standards, says the company, and conform to the full load torque ratings of small standard motors.

The brake wheel is relatively large, allowing low total brake shoe pressures which,



Solenoid operated breaks

distributed over the large brake lining area, result in low unit pressure on the lining and therefore long even wear of the friction surfaces, it is claimed, as well as low degrees of stress on all pins and pivot points. Dimensions of the A. C. and D. C. brakes are interchangeable.

The new brakes are intended for applications on conveyors, small hoists and similar equipment.

Self-Balancing Indicating Potentiometer

A NEW indicating potentiometer of the self-balancing type is announced by the Brown Instrument Co., Philadelphia, Penn. Aside from this main design feature, the new potentiometer also has an unusually long slide wire, positive spiral shaft drive, a non-slip clutch, a secondary pointer fixing the size of step in moving the slide wire contact, interchangeable case for universal mounting, automatic thermal equalization between cold junction terminals and compensation coil and other construction and operating advantages of interest and value.

As a pyrometer this instrument can be supplied for any range from 0 to 100 deg. F. up to 0 to 3000 deg. F. or for almost any span between these ranges.

Magnetic Starter

ALTHOUGH designed for severe service on heavy industrial jobs, the new oil-immersed, across-the-line, combination magnetic starters, designed by the Electric Controller and Manufacturing Co. is comparatively small and narrow with vertical-swing covers. "This makes them especially desirable," says the company, both for mounting in restricted spaces such as between the flanges of columns, for mounting on motor driven machines, or in series. This starter type is available for motors up to 30 hp. 220, volts, 60 hp., 440 volts and 75 hp., 550 volts.

Non-Metallic Bearings

GATKE bearings, for a number of years made exclusively for steel mill service, are now available in a complete line for all general machinery uses, according to an announcement of the Gatke Corp., Chicago, Ill.

Movable Crushing Plant

TRAYLOR ENGINEERING AND MANUFACTURING Co. has designed what it terms a "semi-portable crushing plant" to help commercial crushed stone producers adjust their operations to an evident tendency toward smaller units and the use of local stone. Two general designs, one for a level site and the other for a side-hill site, are shown in the accompanying sketches.

The crushers used in this plant are standard stationary machines mounted on steel skids which are provided with means for attaching suitable wheels and axles for transportation from place to place. When an operating location is reached, the wheels and axles are removed and set aside, and the crushers on their skids are placed upon and fastened to mud sills provided for the purpose. No other provisions for anchoring are said to be necessary, the crushers being sufficiently heavy to successfully oppose the pull of the driving belts.

The elevator is of the belt and bucket type and is belt driven from a pulley attached to one of the flywheels of the jaw crusher. The vibrating screen shown is made with two decks but more may be used if a variety of sizes of product is to be prepared. Also more than one screen may be used if the purchaser desires. The screen is belt driven from a pulley on the head shaft of the elevator.

The storage bin, which is also the elevator support, is made entirely of steel and is fabricated in such manner that it may be bolted together or knocked down easily and in a very short time. It is claimed that it is easily possible to erect the bin and have it and the elevator ready for duty by the time the crushers are dismantled and set in position. The bin is fitted with a suitable bottom discharge gate for loading trucks to transport the stone to the job. The bin may

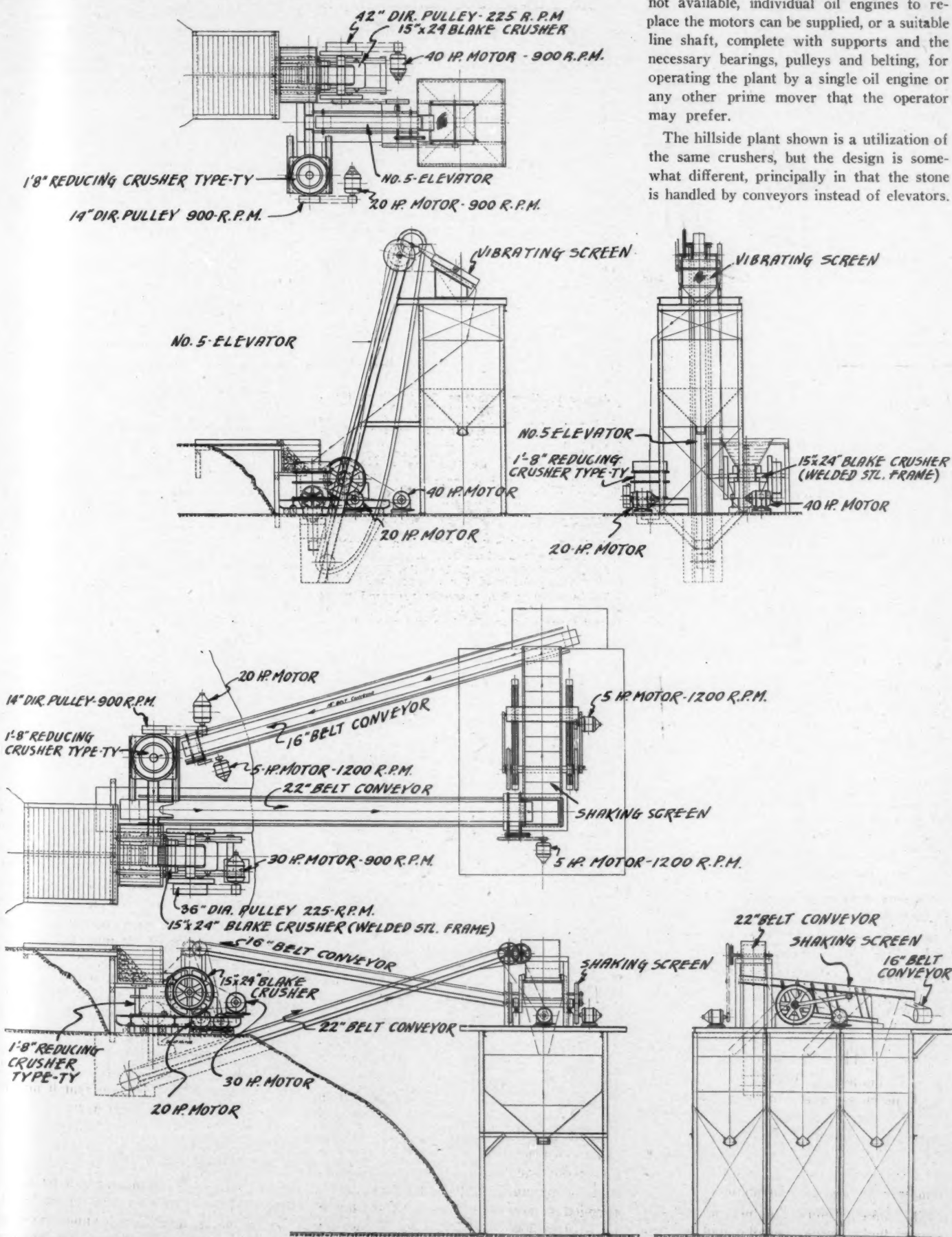
be secured in more than the single section illustrated, if desired.

The plant shown is operated by a 20-hp.

and a 40-hp. electric motors, the former for the 1 ft. 8 in. reduction crusher and the latter for the jaw crusher and the balance

of the equipment. The motors are fitted with skids to facilitate handling and setting. For locations where electric power is not available, individual oil engines to replace the motors can be supplied, or a suitable line shaft, complete with supports and the necessary bearings, pulleys and belting, for operating the plant by a single oil engine or any other prime mover that the operator may prefer.

The hillside plant shown is a utilization of the same crushers, but the design is somewhat different, principally in that the stone is handled by conveyors instead of elevators.



"Semi-portable" crushing plant layouts for level site (above) and for hillside (below)



THE INDUSTRY

New Incorporations

Henry Cowell Lime and Cement Co., San Francisco, Calif., capital stock \$500,000.

Southern Concrete Company, Louisville, Ky., \$5,000. C. W. Stooke, M. G. Stooke and C. C. Collier.

Sharpe Sand and Gravel Co., Wilmington, Del., to deal in sand, gravel, and clays. \$3,000. Martin E. Smith.

Edison Concrete Corp., New York, N. Y., concrete, cement, stone and brick. \$10,000. Filed by Maxwell Berman.

Dayton Sand and Gravel Co., Oklahoma City, Okla. Tom C. Dayton, of Dougherty, and Carol Porter, of Oklahoma City, are incorporators.

Palestine Quarries, Ltd., Mt. Vernon, N. Y., to do quarrying; 198 shares, no par. Jehiel R. Elyachar, Sol Nitzberg, and Louis L. Simberkoff are incorporators.

Valley Washed Sand and Gravel Corp., Muskego, Wis., to operate a gravel pit. 200 shares at \$100 each. Frank J. Mayworm and Kate and Tom Filich are incorporators.

J. and F. Co., Milwaukee, Wis., to deal in mineral aggregates, stone, gravel, sand. 500 shares common stock, no par value. Incorporators are Herbert Morse, Marshall J. Palakow and Rose Glinberg.

Berlin Brick and Sand Co., Atlantic City, N. J., to manufacture, buy and sell brick, sand, cement and concrete materials and supplies. 1,000 shares, no par. John Quigley, H. Walter Schmeck and Ralph Harcourt are incorporators.

Personals

W. H. Small, district engineer of the Portland Cement Association, recently addressed the Rotary Club in Topeka, Kan.

Charles L. Hogan, president of International Cement Corp., was elected a director of Equitable Trust Co., New York, N. Y., in August.

Geo. Badger, representing Hadfields, Ltd. (East Hecla Works), Sheffield, Eng., was a recent visitor to the office of Rock Products.

Horace J. Young has been appointed acting district engineer in charge of the Portland Cement Association office at Lincoln, Neb. He succeeds D. D. Price.

Harry O. Underhill, Birmingham, Ala., southern manager of Alpha Portland Cement Co., has accepted a co-chairmanship of the local community chest campaign.

Kenneth Cookson, superintendent of Concho Sand and Gravel plant, Pawhuska, Okla., was married in July to Wilma Lila Turner, daughter of Mrs. Elizabeth Turner of Pawhuska.

Laverne Adams, Naples, Wis., has been appointed supervisor of limestone crushing for the county drouth relief program by the County Agricultural Committee which met in Alma, Wis.

Robert Beatty, of the Dolceto Quarry Co., was among the group of industrialists recently signed up in Birmingham, Ala., for a tour of inspection through the Alabama Pyrotechnic Institute farm at Auburn, Ala.

Sewell L. Avery, president of the U. S. Gypsum Co., and chairman of the board of Montgomery Ward & Co., was one of nine industrial leaders recently appointed as members of American Standards Association's advisory committee.

George Philip, Rapid City, S. D., chairman of the South Dakota cement plant commission, recently resigned to become United States district attorney for South Dakota. He has served in preceding years as secretary, treasurer, and chairman of the commission.

C. L. Wagner, vice-president of Superior Portland Cement Co., recently addressed the Washington State Planning Council appointed by Governor C. D. Martin, at a meeting in Tacoma. His subject was "The Relation of the Cement Industry to the Growth of the State."

Obituaries

Ralph S. Hale, 46, chemical engineer formerly with the Atlas Portland Cement Co., died recently in El Paso, Tex.

Will M. Williamson, manager of the Memphis Stone and Gravel Co., Memphis, Tenn., died August 14.

James A. Wheeler, 70, vice-president of the Lone Star Cement Co., died at his home in Dallas, Tex., August 12.

John Wolf, 52, for many years operator of the Downsview Stone Quarry, died recently at Eau Claire, Wis.

Richard J. O'Neil, manager of the Southern Ohio Quarries Co., and of the Chillicothe Sand and Gravel Co., died recently at Chillicothe, Ohio.

Albert A. Borsodi, a senior salesman of Limestone Products Corp. of America, Newton, N. J., recently died in the Memorial Hospital, New York, N. Y., after a long illness.

Owen H. Hess, a pioneer in the development of the cement industry in Northampton and Nazareth, Penn., died recently. He was 79. Thirty-five years ago he became superintendent of the Dexter cement mill, Nazareth.

James William Jameson, 72, southern California oil magnate, organizer of the Blue Diamond Building Materials Co., Los Angeles, and reported as a major stockholder in the Monolith Portland Cement Co., died August 6. After a period of study and teaching, he was admitted to the bar in Utah in 1892. Five years later he returned to California.

Quarries

S. T. McAllister has opened a limestone operation near Patterson, Mo.

Adler Rock Quarry, Eatonville, Wash., recently was scheduled for re-opening.

Tobin Quarry Co. recently resumed work on its property southwest of De Witt, Mo.

Lay Construction Co. has put rock crushing equipment into operation east of Armstrong, Mo.

Cass County Quarries, Weeping Water, Neb., are being operated with two shifts to supply material for government projects.

Menominee County commissioners have purchased rock crushing equipment and recently put it in operation at Wallace, Wis.

Parker-Schran Rock Quarry, Rocky Point, Wash., has been supplying jetty rock for the Altona and Sand Island jetties near Gray's Bay.

A. J. Colyer Stone Quarry, Somerset, Ky., has received a contract from the State Highway Dept. for 2,000 tons of stone to be used on a highway project.

Ohio State Commission has approved a \$42,224 Federal Emergency Relief Administration project for operation of the Youngstown stone quarries, Youngstown, Ohio.

Jefferson County Board of Supervisors, Fairfield, Ia., recently concluded negotiations with Prudential Life Insurance Co. representatives for establishing a quarry on the company's land north of the Anderson Quarry.

Three limestone quarrying projects are under way in the vicinity of Blair, Wis. Joseph Onsrud, of Oak Ridge, has received the appointment as lime supervisor for the county from the state industrial commission. Projects under way are at Peacock Hill, Gale; Beacon Mountain, Trempealeau; and Oak Ridge, Arcadia.

Cedar County commissioners, reporting from Tipton, Ia., have established quarries as relief projects near Bennett, Lowden, Clarence, Cedar Bluffs, Cedar Valley, Tipton and Lime City. Only two now are in full operation. In the recent five-month period, the quarries supplied 120,436 cu. yd. of crushed stone for highway work.

Skokumchuck Canyon Quarry, near Tenino, Wash., is to be the source for material used in jetty work at Gray's Harbor. The Public Works Administration project in this instance is to cost \$4,565,000. Stone from the canyon quarry is porphyritic granite, weighing about 180 lb. to the cu. ft., according to U. S. Government engineers who have declared it as the best jetty material west of the Mississippi River. The stone appropriation calls for about \$2,000,000.

Sand and Gravel

A gravel pit has been opened on the Rippenberger property near Humboldt, Ia.

A new gravel pit has been opened at Steamboat Rock near Grundy Center, Ia.

The gravel plant at Marble Hill, Mo., recently has been operating two shifts a day.

A new gravel pit has been opened near Cardington, Ohio, by Orville Philbrook and George Germaine.

Koch Sand and Gravel Co. recently has been operating its fleet on the Ohio River, near Mt. Vernon, Ind.

Rogue River Sand and Gravel Co., Grants Pass, Ore., is the new corporate name of Wilcox Sand and Gravel Co.

Genesee Gravel Pits, Inc., Buffalo, N. Y., recently filed notice that its corporate name now is Wende Gravel Co.

A motorcade of sand trucks recently was organized to take beach sand from the pit of F. H. Bailey and Sons, Kenton, Ohio, to the community swimming pool.

Cement

Superior Portland Cement Co. quarry at Concrete, Wash., was closed in August.

Monarch Cement Co. plant, Humboldt, Kan., recently was damaged by an explosion in its laboratory.

Consolidated Cement Corp., Fredonia, Kan., has equipped its offices with a modern air-conditioning system.

Giant Portland Cement Co. plant at Egypt, Penn., closed August 1, but shipments are being continued from stock.

Medusa Portland Cement Co. offices in Cleveland, Ohio, recently were moved to new quarters in the Midland Building.

Lehigh Portland Cement Co. plant at New Castle, Penn., was put into operation again August 6, after an extended shutdown.

Cumberland Portland Cement Co. plant, Cowan, Tenn., reported its first serious accident in several years. Hanson Ferrill, 42, a negro workman, slipped and fell from a box car.

Alpha Portland Cement Co. plant at Iron-ton, Ohio, resumed operations August 16 after being idle for two weeks while repairs were made to its power plant. Superintendent Frank Brownstead reports that the operation will be on the basis of 50 per cent.

With resumption of restricted operation at the plant of **Phoenix Portland Cement Co.**, Powderly, Ala., four out of six of the cement plants in the Birmingham area were in operation early in August. Cement production throughout the South is said to be approximately 15 per cent greater than at this time last year.

Cement Products

Grohne Concrete Products Co., Decatur, Ill., has undertaken the manufacture of concrete joists and beams.

S. W. O'Neal, president of O'Neal Block and Septic Tank Co., Miami, Fla., reports that concrete block orders this year greatly exceed the volume in 1933.

Cement Products Co., Lake City, Fla., has extended its activities by signing a two-year lease on the planing mill, lumber sheds and racks of the Harden Lumber Co. which adjoin its plant.

Miscellaneous

Slag crusher employees of the Carnegie Steel Co., Youngstown, Ohio, recently held their annual picnic.

Blue Valley Slate Co., near Slatington, Penn., was destroyed by fire in August. Damage is listed at \$10,000.

A **Cherokee Lime Co.** steamboat was damaged by fire at Knoxville, Tenn., August 9. The boat has been used to tow sand and lime rock barges to the company's plant east of Knoxville.

Manufacturers

Jeffrey Manufacturing Co., Columbus, Ohio, has appointed A. F. Brosky as special engineer.

Austin-Western Road Machinery Co. has moved its general offices to 601 Farnsworth Ave., Aurora, Ill.

International Paper Co., New York, N. Y., has appointed Roy I. La Marche as sales manager.

Whiting Corp., Harvey, Ill., is observing its 50th anniversary. J. H. Whiting, founder, is chairman of the board.

Sivyer Steel Casting Co., Milwaukee, Wis., announces A. N. Diecks as manager of its new office established in New York, N. Y.

Zalk-Joseph Co., Duluth, Minn., has been appointed distributor for the Macwhyte Co. and will stock a complete line of Macwhyte wire rope.

Patterson Foundry and Machine Co., East Liverpool, Ohio, announces William Soherr as manager of New England territory with headquarters at Boston.

Chain Belt Co., Milwaukee, Wis., has named Jenison Machinery Co., San Francisco, Calif., as distributor of "Rex" equipment in northern California.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has removed its Chicago office to the Field building, 135 S. La Salle St. B. F. Bilsland is manager of the Chicago district.

Automatic Nut Co., Inc., New York, N. Y., now is conducting all business of the General Automatic Lock Nut Corp., following reorganization of the latter concern.

Louis Allis Co., Milwaukee, Wis., announces that the company headquarters in Pittsburgh, Penn., have been moved to 537 Oliver Building. They are in charge of J. F. Rodgers.

Louis Allis Co., Milwaukee, Wis., more than trebled its sales for the first six months of 1934 over the same period of 1933, and attributes the increase partly to improved delivery service.

United States Rubber Co., Akron, Ohio, has named Ralph C. Harden, veteran sales executive, as manager of packing sales in the mechanical goods division, with headquarters in New York City.

Hardinge Co., York, Penn., announces the return of Harlowe Hardinge, vice-president and general manager, from Europe. He reports business in England as excellent—"up to that of 1928 and 1929."

Chicago Pneumatic Tool Co., New York, N. Y., has purchased patents, goodwill and property of Mitchell Diamond Drill Co., Ltd., San Francisco, Calif., for which it has acted as the general sales agent for the last two years.

Link-Belt Co., Chicago, Ill., has appointed J. J. Richards as manager of its vibrating screen department. He succeeds Harry L. Strube, who has been promoted to the position of assistant chief engineer in the company's Philadelphia plant.

Bucyrus-Erie Co., South Milwaukee, Wis., has appointed Crook Co., Los Angeles, Calif., its Southern California distributor of (2-yd. capacity) excavating equipment. It also announces Burgman Tractor-Equipment Co. of Jacksonville, Fla., as its distributor in northern Florida for excavating equipment.

Sullivan Machinery Co., Chicago, Ill., reports use of its three-drum scraper hoists and O'Rourke switches in the Twin Lakes Tunnel at Independence Pass, Colo., first trans-mountain water diversion project in the West. Upon completion, the tunnel will be nearly four miles long with a diameter of 9 ft. 2 in., running through at an elevation of 9,050 ft.

Dorr Co., Inc., New York, N. Y., recently celebrated the 30th anniversary of the Dorra classifier. At the company's plant in Westport, Conn., John Van Nostrand Dorra, inventor of the classifier, thickener, etc., bearing his name, christened a scale model of the first classifier unit. Entry of the company's machine into the sand and cement industries was noted as 1915 and 1917, respectively.

Link-Belt Co., Chicago, Ill., has made several new appointments in its "Positive Drive Division." G. H. Burkholder, of Philadelphia, has been named western sales manager, with headquarters in Indianapolis. W. H. Kinkead takes Mr. Burkholder's place as sales manager of speed reducers, and G. L. Gansz succeeds Mr. Kinkead in charge of Philadelphia office sales of the positive drive division.

Foster Wheeler Corp., New York, N. Y., has taken over exclusive rights for the sale and manufacture of the Ruths Steam Storage Systems in the United States and Canada. Ruths Accumulators will complement the present line of Foster Wheeler power plant equipment. G. M. Cameron, formerly manager of Ruths Steam Storage Company, will be manager of the Ruths Accumulator Division of Foster Wheeler.

Cotton-Textile Institute, Inc., New York, N. Y., announces that more than 100,000,000

cotton sacks were used for shipment of cement in 1933. Discussing the economy of cotton containers since the government has lapsed the processing tax on large size cotton bags, the Institute declares evidence shows that cotton cement bags may be used seven or eight times for shipment of cement, as contrasted with "single trip" containers.

After twenty years in New York City, the executive offices of S K F Industries, Inc., have been consolidated with the Philadelphia (Penn.) plant. The company, says an official, is "peculiarly fitted to render scientific studies and to advise in anti-friction problems and design, inasmuch as it is a part of a world-wide organization maintaining six research laboratories, 15 plants and 250 factory branch offices throughout the world. In the belief that a precision product requires every modern facility, the company has not only scientifically grouped its departments, but has made vast expenditures for latest scientific and mechanical devices."

General Electric Co., Schenectady, N. Y., reversing the order of the old "Wild West" at A Century of Progress used a gun to "shoot on" the lights in its House of Magic instead of shooting them out. A full-size gun that shoots bullets of light instead of lead or steel is a feature of the company's display. Instead of the customary cartridge, a small incandescent lamp with concentrated filament is built into the gun. A pull on the trigger throws a switch that flashes a short but intense beam of light from the barrel of the gun, and the "light bullet" registers a hit on a photoelectric target when the operator's aim is good.

Trade Literature

Pulverizers. Bulletin 13, in eight illustrated pages gives full description of impact pulverizers. WHITING CORP., Harvey, Ill.

Packings. Rod, plunger, piston, packing, etc., fully described in 48-page illustrated booklet. JOHNS-MANVILLE, INC., New York, N. Y.

Dust Collectors. Advertising broadside illustrates and describes new all-metal cloth-screen collector. PANGBORN CORP., Hagerstown, Md.

Bearings. Forty-two page loose-leaf booklet covers specifications, load ratings, etc., on four series of bearing line. MEDART CO., St. Louis, Mo.

Compressors. Four-page illustrated folder on "Steam Booster" compressor line. WORTHINGTON PUMP AND MACHINERY CORP., Harrison, N. J.

Cranes. New 16-page catalog on locomotive cranes carries tables of clearance dimensions, capacity ratings, etc. LINK-BELT CO., Chicago, Ill.

Motors. Heat-protected motor line is described in four-page bulletin on "Linc-Weld" motors. LINCOLN ELECTRIC CO. OF CANADA, LTD., Toronto, Ont.

Highways. The "short-count" method of making road traffic surveys outlined in 50-page illustrated booklet. PORTLAND CEMENT ASSOCIATION, Chicago, Ill.

Pumps. Horizontal "Duplex" piston pumps for general service described in Bulletin W-101-B1. WORTHINGTON PUMP AND MACHINERY CORP., Harrison, N. J.

Screens. Flanged lip screen development offered as medium for stone and gravel screening and dewatering. HENDRICK MANUFACTURING CO., Carbondale, Penn.

Aggregate. Applications, testimonials, and merchandising plans of special lightweight concrete aggregate are described in loose-leaf booklet. POTTS CO., Chicago, Ill.

Furnaces. A 12-page illustrated planograph bulletin deals with furnace pressure control. System of automatic control is fully described. LEEDS AND NORTHRUP CO., Philadelphia, Pa.

General. "Inflation Delays Recovery" is No. 5 in a series of booklet editorials by A. W. Rucker, in collaboration with N. W. Pickering. FARREL-BIRMINGHAM CO., INC., Ansonia, Conn.

Tools. Eight-page bulletin 2037-A covers line of pneumatic tools including a "Multi-Vane" drill, push-throttle screw-drivers, nut setters. CANADIAN INGERSOLL-RAND COMPANY, LTD., Montreal, Que.

Gears. Continuous-tooth herringbone reducers and gears treated fully with many entire pages devoted to illustrations and specifications in Catalog 137; 96 pages. D. O. JAMES MFG. CO., Chicago, Ill.

Leather Belting. Data on transmission interspersed with comments on general topics, including politics, in "The Houghton Line" for August-September, 1934. E. F. HOUGHTON AND CO., Philadelphia, Penn.

Dust Collectors. "Multi-cyclone" type of dust collector reviewed and illustrated in 4-page bulletin with single-page supplement on "Thermix" dust collecting fans. PRAT-DANIEL CORP., New York, N. Y.

Breakers. Primary jaw-breaker with jaw opening of 18x38 in., illustrated and described in detail in four-page loose-leaf folder. Form 34-B. AUSTIN-WESTERN ROAD MACHINERY CO., Chicago, Ill.

Steels. A guide to fabrication of stainless clad steel. The 16-page booklet takes up, step by step, various methods of welding, from soldering to modern heat treating. INGERSOLL STEEL AND DISC CO., Chicago, Ill.

Valves. Bulletin V-102 includes illustrations, blue prints, etc., covering different types of lubricated plug valves for various working pressures. Flanged and screwed valves shown. NORDSTROM VALVE CO., Pittsburgh, Penn.

Welding. "The Maintenance of Reciprocating Parts" is a pamphlet dealing with applications, by oxy-acetylene process, of wear-resisting bronze to wearing surfaces of sliding parts. LINDE AIR PRODUCTS CO., New York, N. Y.

Vibrators. Thirty-two-page illustrated booklet on "Vibration" includes data on vibrated concrete, vibration equipment and recommended practices for proportioning concrete for vibration. PORTLAND CEMENT ASSOCIATION, Chicago, Ill.

Screens. No. 1 of Vol. 27 of "Through the Meshes" gives brief data on drying costs in relation to screening, conveying, etc., notes on screening equipment, punctuated with paragraphs and brief articles on general topics. W. S. TYLER C., Cleveland, Ohio.

Tumbling Mills. Improved and standardized line of tumbling mill equipment featured by roller-bearings throughout, new barrel construction, new driving and clutch devices, outlined in 8-page illustrated folder. W. W. SLY MFG. CO., Cleveland, Ohio.

Screens. Bulletin 1462 covers a line of vibrating screens for sand, gravel, stone, cement, etc. Unbalanced-pulley, as well as positive drive types of screens are covered, including a positive drive screen for operation at a flat angle. LINK-BELT CO., Chicago, Ill.

V-Drives. Catalog 160 (16 pages) covers "V-Flat" drives in complete range of sizes for all ratings up to 300 hp., "for use in general industrial service where large speed ratios and very short centers are involved." Large pulley is flat instead of grooved in application of "V-Flat" drive. DAYTON RUBBER MFG. CO., Dayton, Ohio.

Buckets. Two types of double hinge, multiple rope buckets fully described: "MF" for material handling and medium heavy excavating; "MH" for heavy material handling and hard digging. Quick opening hinge and scoop shape for hard digging are cited as features. WELLMAN ENGINEERING CO., Cleveland, Ohio.

Conveyors. A 16-page catalog describes line of continuous flow conveyors standardized for application to bulk material handling. Horizontal, vertical, inclined, and corner-turning units described. Incidental reference to the use of this "skeleton flight" conveying equipment for cement, lime, and mica plate. STEPHENS-ADAMSON MFG. CO., Aurora, Ill.

Drills. Bulletin 2096 covers the "Calyx" core drill used for boring small or large cores for exploration or other purposes. Units specially described will bore a core 2½ inches in diameter, 2,500 feet deep to reveal the nature of the rock structure. Operation also is described for boring larger cores up to 3¼ inches in diameter, 200 feet deep. INGERSOLL-RAND CO., Phillipsburg, N. J.

Leather Belting. Robert W. Drake is author of the 226-page illustrated treatise on leather belting published under the title "Fifty Reports on the Mechanical Power Transmission from Motor Drive to Industry." Compiled at a stated cost of \$16,000 for members of the American Leather Belting Association, the work is quite free from propaganda and covers practical plant applications. Among subjects fully discussed are the maintenance of all kinds of motor drives, including multiple V-belts, regular belting, chains and gears. Hints on trouble elimination are given for those in practical charge of transmission problems. AMER-

Digest of Foreign Literature

By F. O. Anderegg, Ph. D.

Consulting Specialist, Pittsburgh, Pa.

Results of Comparative Tests on Cements in Sea and in Soft Waters. Pietro Periani gives the results of comparative tests lasting to four years on portland cements, portland cements with puzzolanic admixtures but still basic, acidic puzzolanic cements and a special aggregate designed for sea water resistance. The first two showed considerable reduction in both compressive and tensile strengths, especially the straight portlands which had often begun to show the effect of the salt action almost immediately. Both the acidic puzzolans and the concrete made with special aggregates, up to an age of 4 years, were as good stored in sea water as in soft water, within the experimental error. To maintain an acidic nature, the ratio of the sum of the silica and alumina to the lime must be greater than two. *Annali dei Lavori Pubblici* (1934) 72, No. 2, p. 77.

Studies on the Celite Part ($4\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot \text{Fe}_2\text{O}_3$) of Portland Cement. Temperature seems to control the amount of lime that can be added to Brownmillerite, according to Shoichiro Nagai and Gentaro Sawayama. The compound itself is readily formed, but more lime is taken in with difficulty. On prolonged heating at 1250 deg. C. and up to 1370 deg. quite a bit more lime is combined, with the possible formation of $6\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot \text{Fe}_2\text{O}_3$ and $3\text{CaO} \cdot \text{Al}_2\text{O}_3$. At 1400 deg. less lime is held and there may be present a sintered mixture of $2\text{CaO} \cdot \text{Fe}_2\text{O}_3$ and the eutectic between $3\text{CaO} \cdot \text{Al}_2\text{O}_3$ and $5\text{CaO} \cdot 3\text{Al}_2\text{O}_3$. On going to 1420 deg. more lime is taken in again as the mix fuses. *Journal of the Society of Chemical Industry, Japan* (Supplemental Binding), 1934, 37, No. 5, p. 264B.

Use of Various Silica and Alumina Raw Materials for Portland Cement. Yoshiaki Sanada reports on studies made with tuffa, coal shale, copper slag, gneiss as raw materials, with which very satisfactory portland cements were manufactured on a small scale. For instance, when for each 100 parts of limestone, gneiss was varied from 22.9 to 25.6 parts and the copper slag from 5.0 to 2.8 parts small variations in lime and iron oxide were obtained, having practically no effect on the strengths obtained. *Journal of the Society of Chemical Industry* (Supplemental Binding), Japan. (1934) 37, No. 5, 256B.

Determination of Workability of Mortar and Concrete. W. Humm, of Zurich, on working with increasing water-cement ratio found the entrapped air which was high for very dry mixes, fell off as water

was added. It also diminished with the number of drops on a flow table. In a mix 1:3:5 by weight the least amount of air was observed with a water cement ratio of 0.60. In a 1:3 commercial sand mortar the minimum came at about 0.42, while with normal sand, 1:3, great difficulty was experienced in eliminating air, the best being as high as 13% air space with 12% mixing water (ratio 0.60).

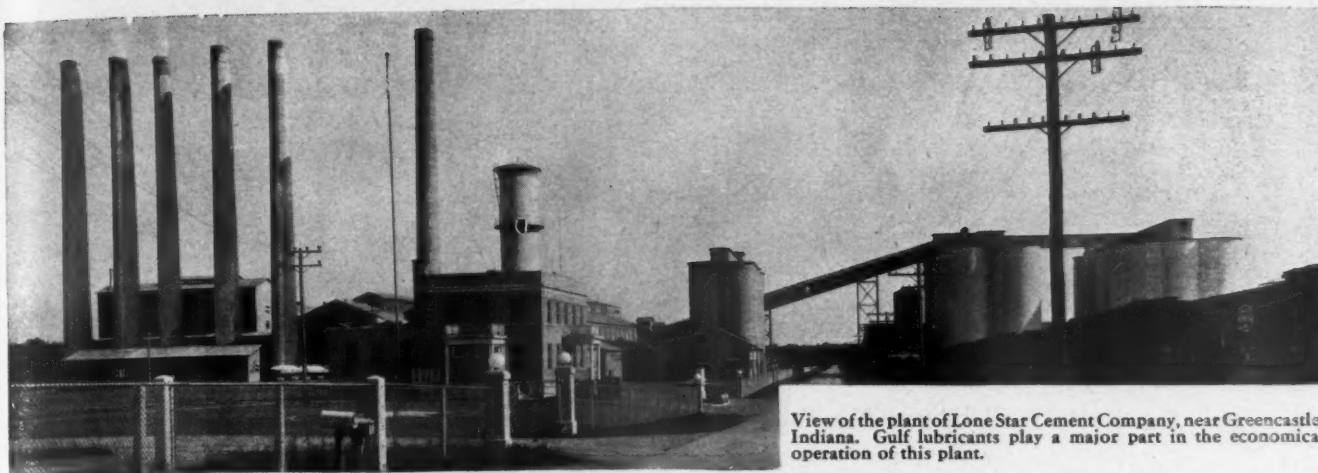
He then experimented with different shapes and sizes of penetrators which should start at rest on a mass of concrete enclosed in a cylinder whose diameter should be at least ten times that of the largest aggregate. The best form for penetration was a cylinder with a cone-shaped end ground to a 30 deg. angle, with a total length of 20 cm., a diameter of 4 cm. and a weight of 1750 g. The extreme point is slightly blunted, and a smaller rod was attached at the top for guiding. The large cylinder holding the concrete then was placed on a flow table and the rate of penetration of the plunger was noted in reference to the number of impacts given the whole. At first, the plunger sank some distance, for a fairly wide range of consistency, then less rapidly for a while, but after the mix became well packed the rate of settling seemed to increase once more. The slopes of the curves were dependent upon the amount of mixing water.

A large number of experiments were made with water worn sand and gravel. When the number of impacts required for penetration was in the range of 80 to 120 the consistency was quite stiff. In the range 20 to 40 it was regarded as soft-plastic and below this, of a fluid consistency. With increasing amount of aggregate, the water required for a given consistency had to be increased. The rate of penetration depended greatly upon the cement content. On reducing the water content of the leaner mixes the penetration rate dropped very rapidly. On changing the ratio of fine to coarse aggregate, for a given consistency, the greater the amount of gravel the less the water required, but the poorer the workability. Best workability was found when sand and gravel were in the ratio 3:5 by weight for the plastic mixes, while the ratio of 3:4 seemed to give best combination of low water requirement and workability for the softer mixes noted. *Beton und Eisen* (1934) 33, No. 12, p. 184.

Concrete from Granulated Blast Furnace Slag. A pier was built in the harbor of Plombino, Italy, in 1905 by Vieri Sevieri, which was protected by nearly 2000 blocks of concrete made from a mix of 65% crushed limestone 26.25% unground, granu-

lated blast furnace slag and 8.75% hydrated lime, by volume. The blocks were about 2x2x4 ft. and were placed around the pier, which is still in very good condition. After 27 years 6 blocks were taken out for examination. In them two pieces of iron bolts were found which had fallen in the original mix accidentally. They were quite free from rust. Cubes cut from the blocks gave an average of 3500 lb. per sq. in. compressive strength, but the cubes were cut in such a way as to reduce their strength by an estimated 25%. The permeability per hour in ml. per sq. cm. averaged about 0.03 at 15 lb. pressure, while at 30 it was about 0.09, which latter may be regarded as permeable. Analyses showed an appreciable increase in silica content, with the insoluble form predominant, whereas originally the silica was nearly all soluble. A great deal of lime had been lost and the sulfide sulfur was appreciably less, while the sulfate content was slightly higher, but much had been leached out. Determinations of the free lime and pH indicated traces only in the center of the blocks. Most of the lime remaining had been carbonated. It was suggested that most of the silica had changed to a flint or opal substance which is the cause of the very high strength. The compounds formed here seemed to differ from those resulting from the use of natural puzzolans, although similar in resistance to the sea water; but this slag concrete has given the higher strengths. *Tonindustries Zeitung* (1934) 58, No. 49, p. 587; No. 50, p. 601.

Comparative Experiments in the Holland East Indies to Determine the Most Favorable Aggregate Grading for Concrete. The distance from any control laboratory led W. Loos to make a large number of experiments with the aggregates available in the East Indies to set up rules for making more satisfactory concrete. He worked out a method of control using a sieve analysis, which he checked with strength, absorption and permeability experiments, and which produced more satisfactory concrete in many cases, and also often at less cost, than had previously been done. His rule is to keep the mortar content of the concrete from 40 to 50% of the whole and in the mortar itself approximately 25% should pass a 50-mesh sieve, 35% a 16-mesh, and about 70% and 8-mesh sieve, with a water-cement ratio of about 0.60, where the sand content is not too high. The mix works out about 1:2:3 with some exceptions determined by local aggregate conditions. All concrete is to be tamped into place. *Zement* 23, No. 24, p. 337.



View of the plant of Lone Star Cement Company, near Greencastle, Indiana. Gulf lubricants play a major part in the economical operation of this plant.

LONE STAR PLANT REDUCES MAINTENANCE COSTS WITH GULF LUBRICATION...

Cement mills effect operating savings by improved lubrication practice

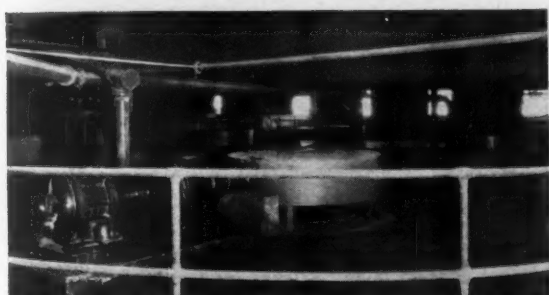


View of the great kiln room in operation. The huge bearings are protected with the right grades of Gulf lubricants.

The heavy machinery operated in cement mills offers great opportunities for savings in maintenance and power costs through improved lubrication.

Leaders in the industry are turning to Gulf for the operating economies they need. The Lone Star mill near Greencastle, Indiana, for example, has found that the scientific application of Gulf quality lubricants gives them a material saving in maintenance and lubrication costs.

If you are not using Gulf products, why not discuss in detail with a Gulf engineer just what improvements may be made in the lubrication and operation of your machinery? He can be of real assistance to you.

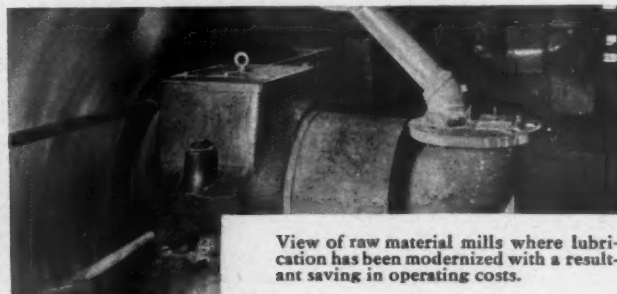


Showing the speed reducers driving agitators. Gulf lubricants keep this equipment in top-notch condition.

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District Sales Offices:
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Installation of wick feed cups on tube mill where the right Gulf lubricant, properly applied, is cutting maintenance costs.



View of raw material mills where lubrication has been modernized with a resultant saving in operating costs.

Are you looking for a new means to reduce operating costs? Write for this booklet.



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Please send me, without charge, "Gulf's 7 Point Plan for Industrial Lubrication."

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Classified Directory of Advertisers in this Issue of Rock Products

For alphabetical index, see page 2

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Agitators, Thickeners and Slurry Mixers
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Fuller Co.
Gardner-Denver Co.
Traylor Eng. & Mfg. Co.

Air Filters
Fuller Co.

Air Separators
Raymond Bros. Impact Pulv. Co.

Armorite (for Chute Lining)
B. F. Goodrich Rubber Co.

Babbitt Metal
Joseph T. Ryerson & Son, Inc.

Backdiggers
Ohio Power Shovel Co.

Backfillers
Austin-Western Road Machy. Co.
Bucyrus-Erie Company
Harnischfeger Corp.
Ohio Power Shovel Co.

Bags
Chase Bag Co.

Balls (Tube Mill, etc.)
F. L. Smidth & Co.

Bar Benders and Cutters
Koehring Company, Division of National Equip. Corp.

Bearings
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Joseph T. Ryerson & Son, Inc.
Timken Roller Bearing Co.

Bearings (Anti-Friction)
Timken Roller Bearing Co.

Bearings (Roller)
Timken Roller Bearing Co.

Bearings (Tapered Roller)
Timken Roller Bearing Co.

Bearings (Thrust)
Timken Roller Bearing Co. *

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Flexible Steel Lacing Co.

Belt Lacing
Flexible Steel Lacing Co.

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Robins Conveying Belt Co.

Belting (Elevator and Conveyor)
B. F. Goodrich Rubber Co.

Belting (Transmission)
B. F. Goodrich Rubber Co.

Bins
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Blaw-Knox Co.
Traylor Eng. & Mfg. Co.

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Fuller Co.
Link-Belt Co.
Robins Conveying Belt Co.
Traylor Eng. & Mfg. Co.

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Bucyrus-Erie Co.

Blasting Cap Protectors
B. F. Goodrich Rubber Co.

Blast Hole Drills
Bucyrus-Erie Co.

Blasting Supplies
Hercules Powder Co.

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Link-Belt Co.
Timken Roller Bearing Co.

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Combustion Engineering Corp.

Boots and Shoes
B. F. Goodrich Rubber Co.

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Smith Engineering Works
Williams Patent Crusher & Pulv. Co.

Buckets (Dragline and Slackline)
Blaw-Knox Co.
Bucyrus-Erie Co.
Wellman Engineering Co.

Buckets (Dredging and Excavating)
Harnischfeger Corp.

Buckets (Elevator and Conveyor)
Cross Engineering Co.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Buckets (Clamshell, Grab, Orange Peel, etc.)
Blaw-Knox Co.
Harnischfeger Corp.
Hayward Co.
Link-Belt Co.
Wellman Engineering Co.

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Blaw-Knox Co.
Koehring Company, Division of National Equip. Corp.

Cableways
American Steel & Wire Co.
Link-Belt Co.
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

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Ensign-Bickford Co.

Caps (Blasting)
Hercules Powder Co.

Car Pullers
Link-Belt Co.
Robins Conveying Belt Co.

Cars (Quarry and Gravel Pit)
Austin-Western Road Machy. Co.

Castings
Eagle Iron Works (Grey Iron)
Link-Belt Co.
Timken Roller Bearing Co.

Cement Making Machinery
F. L. Smidth & Co.

Cement Process
Cement Process Corp.

Cement Pumps
Fuller Co.
F. L. Smidth & Co.

Central Mixing Plants (Concrete)
Blaw-Knox Co.

Chain (Dredge and Steam Shovel)
Bucyrus-Erie Co.
Jeffrey Mfg. Co.

Chain (Elevating and Conveying)
Chain Belt Co.
Link-Belt Co.

Chain Drives
Chain Belt Co.

Chain Systems (Kilns)
F. L. Smidth & Co.

Chutes for Minimizing Segregation
Robins Conveying Belt Co.

Chutes
Cross Engineering Co.

Chutes and Chute Liners
Manganese Steel Forge Co.

Clamshells
Bucyrus-Erie Co.

Classifiers
Link-Belt Co.

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American Steel & Wire Co.
Williamsport Wire Rope Co.

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Austin-Western Road Machy. Co.
Williams Patent Crusher & Pulv. Co.

Coal Pulverizing Equipment
Pennsylvania Crusher Co.
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
Williams Patent Crusher & Pulv. Co.

Compressed Air Rock Drills
Gardner-Denver Co.

Compressed Air Hoists
Gardner-Denver Co.

Compressors (See Air Compressors)

Conveyor Idlers and Rolls
Bartlett, C. O., & Snow Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Conveyors and Elevators
Earle C. Bacon, Inc.
Fuller Company
Jeffrey Mfg. Co. (Vibrating)
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
Robins Conveying Belt Co.
F. L. Smidth & Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.

Conveyors (Pneumatic)
Fuller Company

Conveyors (Screw)
Link-Belt Co.

Coolers (See Kilns and Coolers, Rotary)

Correcting Basins
F. L. Smidth & Co.

Couplings (Flexible and Shaft)
Link-Belt Co.

Couplings (Hose, Pipe, Etc.)
B. F. Goodrich Rubber Co.

Cranes (Clamshell)
Austin-Western Road Machy. Co.

Cranes (Crawler and Locomotive)
Austin-Western Road Machy. Co.

Cranes (Overhead Traveling Electric)
Harnischfeger Corp.

Crusher Parts
Pennsylvania Crusher Co.

Crushers (Hammer)
Austin-Western Road Machy. Co.
Dixie Machy. Mfg. Co.
Pennsylvania Crusher Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Single Roll)
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.

Crushing Rolls
Jeffrey Mfg. Co.
Traylor Eng. & Mfg. Co.

Dedusters
Blaw-Knox Co.

Derricks and Derrick Fittings
Harnischfeger Corp.

Diaphragms (Pump)
B. F. Goodrich Rubber Co.

Dippers and Teeth (Steam Shovel)
Bucyrus-Erie Co.
The Frog, Switch & Mfg. Co.
Marion Steam Shovel Co.

Ditchers
Bucyrus-Erie Co.
Harnischfeger Corp.
Marion Steam Shovel Co.

Draglines
Bucyrus-Erie Co.
Harnischfeger Corp.
Koehring Company, Division of National Equip. Corp. (Gasoline and Electric)
Link-Belt Co.
Marion Steam Shovel Co.
Northwest Engineering Co.

Dragline Excavators
Bucyrus-Erie Co.
Harnischfeger Corp.
Marion Steam Shovel Co.
Northwest Engineering Co.
Ohio Power Shovel Co.

Dragline Cableway Excavators
Bucyrus-Erie Co.
Link-Belt Co.
Marion Steam Shovel Co.

Dragline Excavators (Walking)
Bucyrus-Monighan Company

Dragshovels
Bucyrus-Erie Co.

Dredge Pumps (See Pumps, Dredging)

Dredges
Bucyrus-Erie Co.
Hayward Co.
Marion Steam Shovel Co.
Morris Machine Works

Dredging Sleeves
B. F. Goodrich Rubber Co.

Drill Bits
Timken Roller Bearing Co.

Drill Sharpening Machines
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Drills, Hammer (See Hammer Drills)



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For alphabetical index, see page 2

- Drills (Rock)**
Gardner-Denver Co.
- Drives (Short Center)**
Allis-Chalmers Mfg. Co.
- Drives (V-Rope)**
Medart Company
- Dryers**
Combustion Engineering Corp.
Traylor Eng. & Mfg. Co.
- Dumpsters**
Koehring Company, Division of National Equip't. Corp.
- Dust Collecting Systems**
Blaw-Knox Co.
- Dust Conveying Systems**
Fuller Co.
- Dust Hoods and Helmets**
Pulmosan Safety Equip't. Corp.
- Dynamite**
Hercules Powder Co.
- Electric Cables and Wires**
American Steel Wire Co.
John A. Roebling's Sons Co.
- Engineers**
Medart Company
Productive Equipment Corp.
Robins Conveying Belt Co.
F. L. Smidth & Co.
- Engines (Steam)**
Morris Machine Works
- Excavating Machinery (See Shovels, Cranes, Buckets, etc.)**
- Excavators (Crawling Tractor)**
Koehring Company, Division of National Equip't. Corp.
- Excavators (Dragline)**
Koehring Company, Division of National Equip't. Corp.
- Explosives**
Hercules Powder Co.
- Fans (Exhaust)**
Jeffrey Mfg. Co.
- Feeders**
Fuller Co. (Cement and Pulverized Material)
Jeffrey Mfg. Co. (Pan and Tube)
Robins Conveying Belt Co.
Smith Engineering Works
- Flights**
Cross Engineering Co.
- Forges (Oil)**
Gardner-Denver Co.
- Furnaces**
Combustion Engineering Corp.
- Fuses (Detonating and Safety)**
Ensign-Bickford Co.
- Gaskets**
B. F. Goodrich Rubber Co.
- Gears and Pinions**
Link-Belt Co.
- Gears (Spur, Helical and Worm)**
Jeffrey Mfg. Co.
- Goggles**
Pulmosan Safety Equip't. Corp.
- Grapples (Stone)**
Blaw-Knox Co.
Hayward Co.
- Grease**
Gulf Refining Co.
- Grizzlies**
Jeffrey Mfg. Co. (Vibrating)
Productive Equipment Corp.
Robins Conveying Belt Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.
- Grizzly Feeders**
Jeffrey Mfg. Co.
Traylor Eng. & Mfg. Co.
- Hammer Drills**
Gardner-Denver Co.
- Hammer Mills (See Crushers)**
- Hoists**
Gardner-Denver Co.
Harnischfeger Corp.
Link-Belt Co.
Northwest Engineering Co.
- Hose (Water, Steam, Air, Drill, Sand Suction and Discharge)**
B. F. Goodrich Rubber Co.
- Hydrators**
Blaw-Knox Co.
- Kilns and Coolers (Rotary)**
Blaw-Knox Co.
F. L. Smidth & Co.
Traylor Eng. & Mfg. Co.
- Kominuters (See Mills)**
- Lamp Guards**
Flexible Steel Lacing Co.
- Lighters (Hot Wire for Safety Fuse)**
Ensign-Bickford Co.
- Lime Handling Equipment**
Fuller Co.
Link-Belt Co.
Raymond Bros. Impact Pulv. Co.
- Linings (Iron for Ball and Tube Mills) (See Mill Liners)**
- Linings (Rubber for Ball and Tube Mills)**
B. F. Goodrich Rubber Co.
- Loaders and Unloaders**
Bucyrus-Erie Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Marion Steam Shovel Co.
Northwest Engineering Co.
Robins Conveying Belt Co.
- Locomotives (Diesel)**
Fate-Root-Heath Co.
Plymouth Locomotive Works
- Locomotives (Diesel-Electric)**
Fate-Root-Heath Co.
Plymouth Locomotive Works
- Locomotive Cranes (See Cranes, Crawling and Locomotive)**
- Locomotives (Electric)**
Jeffrey Mfg. Co.
- Locomotives (Steam, Gas and Electric)**
Lima Locomotive Works, Inc.
Plymouth Locomotive Works (Gas)
- Locomotives (Gas-Electric)**
Fate-Root-Heath Co.
Plymouth Locomotive Works
- Locomotives (Storage Battery)**
Jeffrey Mfg. Co.
- Locomotives (Oil-Electric)**
Fate-Root-Heath Co.
Plymouth Locomotive Works
- Locomotives (Geared)**
Lima Locomotive Works, Inc.
- Log Washer**
McLanahan & Stone Corp.
Smith Engineering Works
- Lubricants**
Gulf Refining Co.
- Lubricants (Wire Rope)**
American Steel & Wire Co.
- Machinery Guards**
Harrington & King Perforating Co.
- Manganese Steel Castings**
The Frog, Switch & Mfg. Co.
- Manganese Steel (Plates and Sheets)**
Manganese Steel Forge Co.
- Manganese Steel Parts**
Manganese Steel Forge Co.
- Mechanical Rubber Goods**
B. F. Goodrich Rubber Co.
- Mills, Grinding (Ball, Tube, etc.) (See also Crushers, Hammer)**
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
Traylor Eng. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.
- Mill Liners and Linings (Iron for Ball and Tube Mills)**
F. L. Smidth & Co.
- Mixers (Concrete)**
Koehring Company, Division of National Equip't. Corp.
- Motor Trucks**
General Motors Truck Co.
- Motors and Generators (Electric Units)**
Harnischfeger Corp.
- Oils (Lubricating)**
Gulf Refining Co.
- Packings (Pump, Valve, Etc.)**
B. F. Goodrich Rubber Co.
- Pavers (Concrete)**
Koehring Company, Division of National Equip't. Corp.
- Perforated Metal**
Chicago Perforating Co.
Cross Engineering Co.
Harrington & King Perforating Co.
Hendrick Mfg. Co.
Morrow Mfg. Co.
- Plate (Double Corrugated)**
Hendrick Mfg. Co.
- Plates**
Cross Engineering Co.
- Portable Conveyors**
Fuller Company
Link-Belt Co.
Robins Conveying Belt Co.
- Portable Crushing and Screening Unit**
Austin-Western Road Machy. Co.
Smith Engineering Works
Williams Patent Crusher & Pulv. Co.
- Power Transmission**
Medart Company
- Pulverators**
Allis-Chalmers Mfg. Co.
- Pulverizers (See also Crushers, Mills, etc.)**
Dixie Machy. Mfg. Co.
Jeffrey Mfg. Co.
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
Williams Patent Crusher & Pulv. Co.
- Pumps (Air Lift)**
Fuller Co.
- Pumps (Cement)**
Fuller Co.
- Pumps (Cement Slurry)**
Morris Machine Works
F. L. Smidth & Co.
A. R. Wilfley & Sons
- Pumps (Centrifugal)**
Morris Machine Works
A. R. Wilfley & Sons
- Pumps (Dredging)**
Bucyrus-Erie Co.
Morris Machine Works
- Pumps (Sand and Gravel)**
Morris Machine Works
A. R. Wilfley & Sons
- Ready-Mixed Concrete (Truck Mixer Bodies)**
Blaw-Knox Co.
- Ready-Mixed Concrete Plants**
Blaw-Knox Co.
- Respirators**
Pulmosan Safety Equip't. Corp.
- Road Machinery**
Blaw-Knox Co.
Harnischfeger Corp.
Koehring Company, Division of National Equip't. Corp.
Marion Steam Shovel Co.
Northwest Engineering Co.
- Rock Bits (See Drill Bits)**
- Rock Drills (See Drills, Rock)**
- Rod Mills**
Traylor Eng. & Mfg. Co.
- Roller Bearings**
Timken Roller Bearing Co.
- Roofing and Siding (Steel)**
Joseph T. Ryerson & Son, Inc.
- Rope, Wire (See Wire Rope)**
- Rubber Covered Screens**
B. F. Goodrich Rubber Co.
- Safety Equipment**
Pulmosan Safety Equip't. Corp.
- Sand Drag**
Smith Engineering Works
- Sand Settling Tanks**
Link-Belt Co.
Smith Engineering Works
- Scrapers (Power Drag)**
Blaw-Knox Co.
Harnischfeger Corp.
Link-Belt Co.
Northwest Engineering Co.
- Screens**
Audubon Wire Cloth Corp.
Bartlett, C. O., & Snow Co.
Chicago Perforating Co.
Cross Engineering Co.
Harrington & King Perf. Co.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
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Ludlow-Saylor Wire Co.
Manganese Steel Forge Co.
Morrow Mfg. Co.
National Wire Cloth Co.
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Robins Conveying Belt Co.
John A. Roebling's Sons Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.
Universal Vibrating Screen Co.
- Screens, Scalping (Hercules and Standard)**
Smith Engineering Works
- Screens (Vibrating)**
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Link-Belt Co.
Productive Equipment Corp.
Robins Conveying Belt Co.
Smith Engineering Works
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.
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- Screw Rewasher (Single and Twin)**
Smith Engineering Works
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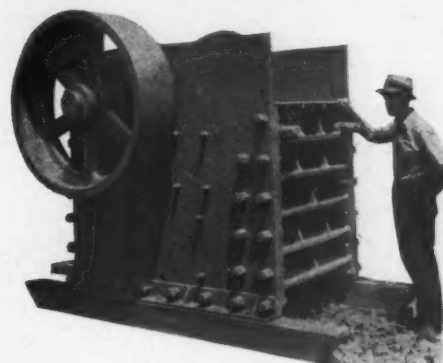
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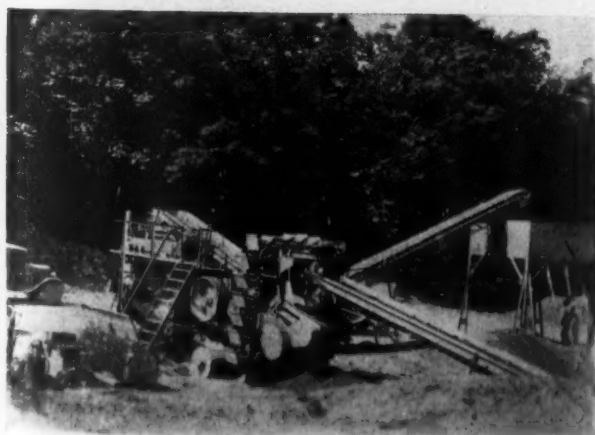
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For alphabetical index, see page 2

Shovels, Power (Steam, Gas, Electric, Diesel, Oil)

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Harnischfeger Corp.
Koehring Company, Division of National Equip. Corp.
Link-Belt Co.
Marion Steam Shovel Co.
Northwest Engineering Co.
Ohio Power Shovel Co.

Silos

F. L. Smidth & Co.

Skip Hoists and Skips

Link-Belt Co.
Robins Conveying Belt Co.

Slings (Wire Rope)

American Cable Co., Inc.
American Steel & Wire Co.
A. Leschen & Sons Rope Co.
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

Sockets (Wire Rope)

American Steel & Wire Co.

Speed Reducers

Link-Belt Co.
Traylor Eng. & Mfg. Co.

Sprockets and Chain

Jeffrey Mfg. Co.

Steel Bars

Timken Roller Bearing Co.

Steel (Bars, Shapes, Plates, etc.)

Joseph T. Ryerson & Son, Inc.

Steel (Electric Furnace)

Timken Roller Bearing Co.

Steel (Open Hearth)

Timken Roller Bearing Co.

Steel (Special Alloy)

Timken Roller Bearing Co.

Steel (Special Analysis)

Timken Roller Bearing Co.

Stokers

Combustion Engineering Corp.

Tanks

Combustion Engineering Corp.
Link-Belt Co.

Texrope Belts (for Texrope Drives)

B. F. Goodrich Rubber Co.

Tires and Tubes

B. F. Goodrich Rubber Co.

Tractors

Koehring Company, Division of National Equip. Corp.

Tramways (Aerial Wire Rope)

American Steel & Wire Co.
A. Leschen & Sons Rope Co.
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

Transmission Belting

(See Belting)

Transmission Machinery

Medart Company
Timken Roller Bearing Co.

Trippers

Robins Conveying Belt Co.

Troughs

Cross Engineering Co.

Truck Bodies (Ready Mixed Concrete)

Blaw-Knox Co.

Trucks and Trailers (See Motor Trucks)

Trucks (Mixing)

Blaw-Knox Co.

Trunkmixers

Blaw-Knox Co.

Tube Mills (See Mills, Ball, Tube, etc.)

Tube Mill Liners (See Mill Liners)

Tubing (Blasting)

B. F. Goodrich Rubber Co.

Tubing (Seamless Steel)

Timken Roller Bearing Co.

V-Rope Drive

Medart Company

Valves (Pump)

B. F. Goodrich Rubber Co.

Vibrating Screens (See Screens, Vibrating)

Washers (Sand, Gravel and Stone)

Eagle Iron Works
Link-Belt Co.
Traylor Eng. & Mfg. Co.

Waste Heat Boilers

Combustion Engineering Corp.

Weigh-Mix

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Welding and Cutting Apparatus

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Welding Rod

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Welding Wire

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Manganese Steel Forge Co.

Wire (Rubber Insulated)

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Wire Cloth

Audubon Wire Cloth Corp.
Ludlow-Saylor Wire Co.
Manganese Steel Forge Co.
National Wire Cloth Co.
John A. Roebling's Sons Co.

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American Steel & Wire Co.
A. Leschen & Sons Rope Co.
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

Wire Rope Fittings

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American Steel & Wire Co.
A. Leschen & Sons Rope Co.
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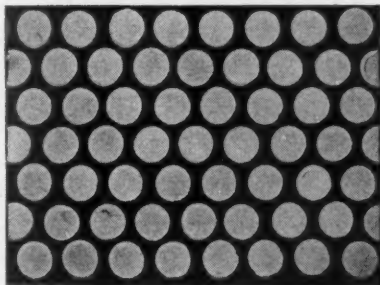
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946 King Street, Wilmington, Delaware

A-41-R

MORROW SCREEN PLATES



MORROW PERFORATED METAL SCREEN PLATES for sizing and preparing coal, sand, gravel, stone and other bulk materials are made by a Company specializing in screening machinery.

A complete set of punches and dies covering a wide range of sizes, in round, square, oval and diagonal slots are ready for the press, insuring prompt delivery of orders.

*Prices are right.
Send for Bulletin 57.*

The Morrow Manufacturing Co.
Wellston, Ohio



**IT
LOWERS
COSTS!**

The Walker takes the place of TWO machines; it strips as well as loads gravel—and at less cost per yard. It can follow an irregular bank, step around obstacles or walk directly away from a slide, without any lost time. As a gravel-digger, the Bucyrus-Monighan has great capacity.

Investigate the advantages of the Bucyrus-Monighan for economical stripping and gravel pit work. Bucyrus-Monighan Company, Chicago, Illinois.



Walking Draglines 1 to 10 cubic yards

Sold by
BUCYRUS-ERIE CO.
South Milwaukee, Wis.

Representatives throughout the U.S.A.
Branch Offices: Boston, New York, Philadelphia, Birmingham, Pittsburgh, Chicago, St. Louis, Kansas City, Dallas, San Francisco. Offices or Distributors throughout the world.

B-57



The News Is Going 'Round!

From man to man... from quarry to quarry... the good news about the Gardner-Denver 6-cylinder ABJ Compressor is spreading. Here's what it does:

Saves

Saves

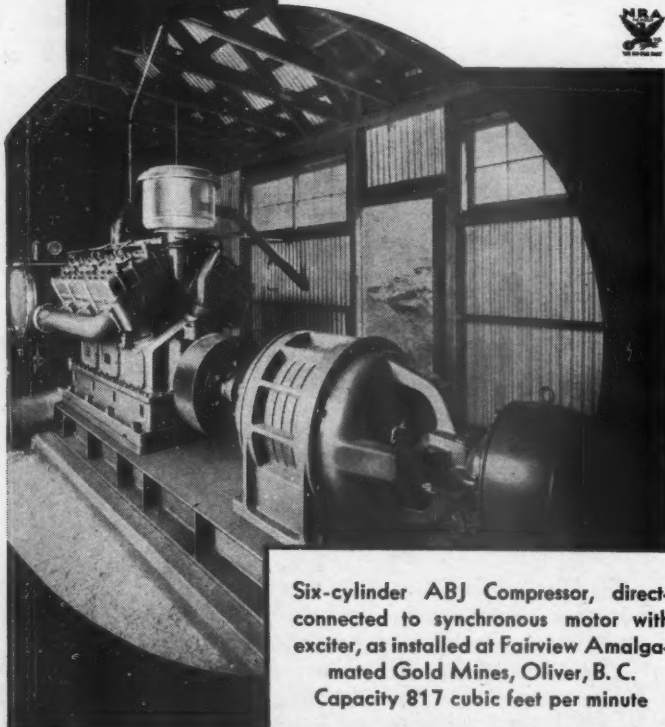
Saves

—in first cost, compared with a horizontal compressor of the same displacement, yet delivers every bit as much air.

—valuable space—requires no big, heavy foundations—makes your plant set-up more compact.

— $\frac{2}{3}$ in installation cost—cuts maintenance costs to the bone because of its superior design.

GARDNER-DENVER CO.
104 Williamson St., Quincy, Ill.

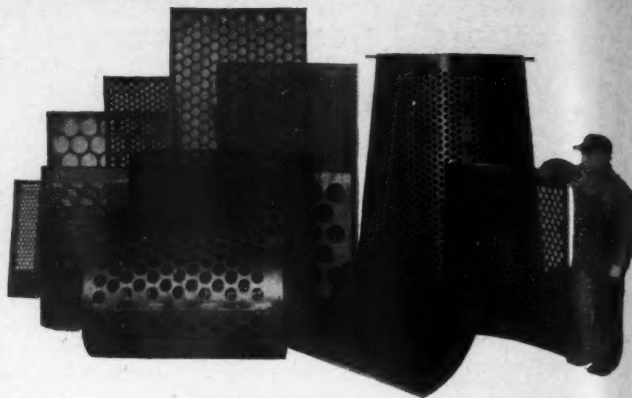


Six-cylinder ABJ Compressor, direct-connected to synchronous motor with exciter, as installed at Fairview Amalgamated Gold Mines, Oliver, B. C. Capacity 817 cubic feet per minute

GARDNER-DENVER

MAKES AIR DO MORE AND COST LESS

SCREENS of Perforated Metal

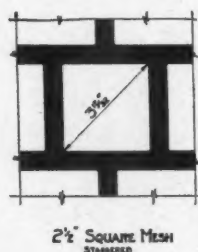


For Sand, Gravel, Stone and Ore. Perforations of all standard types, also of unusual sizes and layouts to give large production and reduced screening costs.

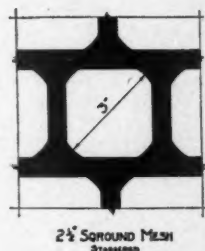
**The Harrington & King
PERFORATING CO.**

5650 Fillmore St., Chicago, Ill. 114 Liberty St., New York, N. Y.

Combining the Advantages of Round Mesh and Square Mesh



2 1/2" SQUARE MESH
STAGGERED



2 1/2" SQRROUND MESH
STAGGERED

Everybody likes square mesh—because of its greater production. But square mesh has a serious disadvantage—the diagonal dimension of the perforation permits the passage of oversize material.

Study the drawings of Square Mesh and "Sqround"* Mesh. Note that the distance between fillets in the corners of "Sqround" Mesh is the same as the diameter of an equivalent round opening. No chance for oversize to get through there—"Sqround" Mesh gives accurate sizing.

"Sqround" is available in any size mesh required, in straight or staggered perforations, in flat plate or in Hendrick Double Corrugated Plate. Write for complete data.

*Registered United States Patent Office.

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Cincinnati Cleveland Detroit
New York Philadelphia Pittsburgh

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Distinctive Among Belt Lacings

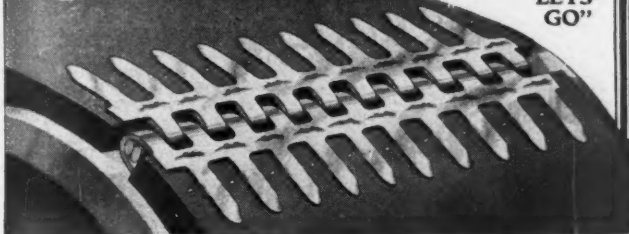
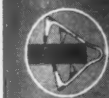
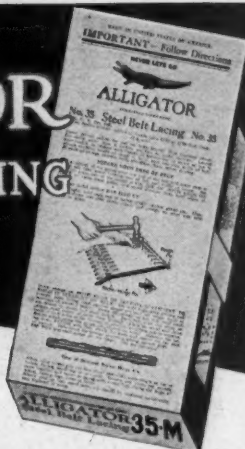
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LETS
GO"



MANGANESE STEEL CASTINGS

for the

Rock Products Industry

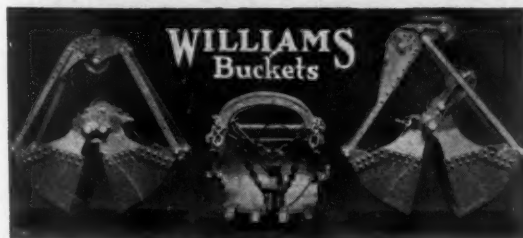
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Known For Its Superior Shock
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Established 1881 Carlisle, Pa.

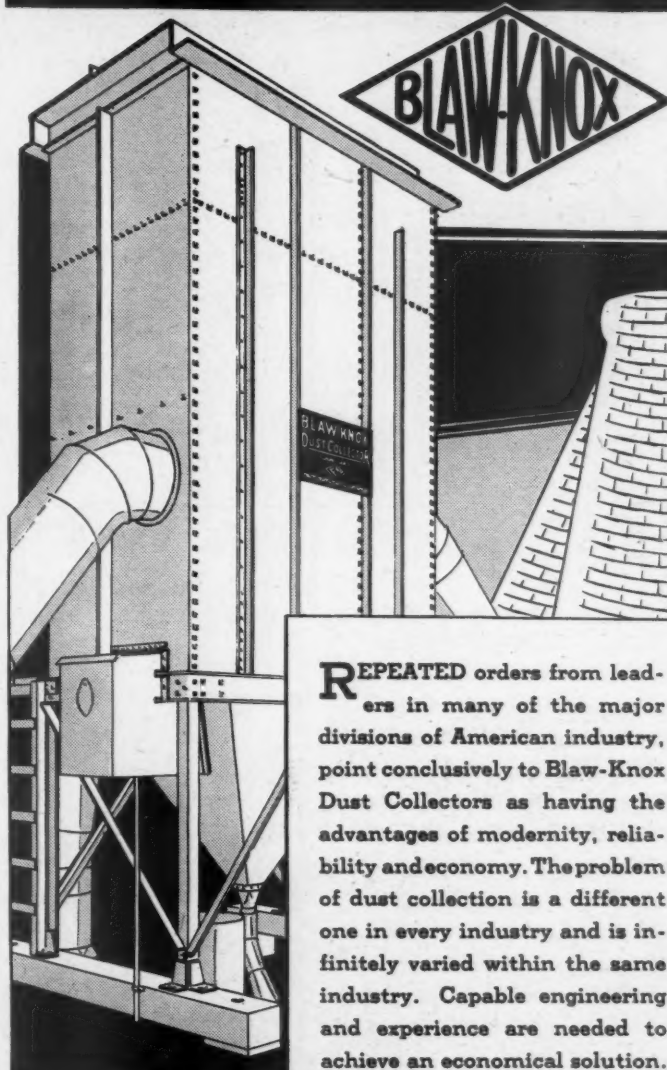
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Multiple-Rope Dragline Power-Arm
Write for bulletins

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SUBMIT YOUR
DUST PROBLEMS
TO BLAW-KNOX

for
solution

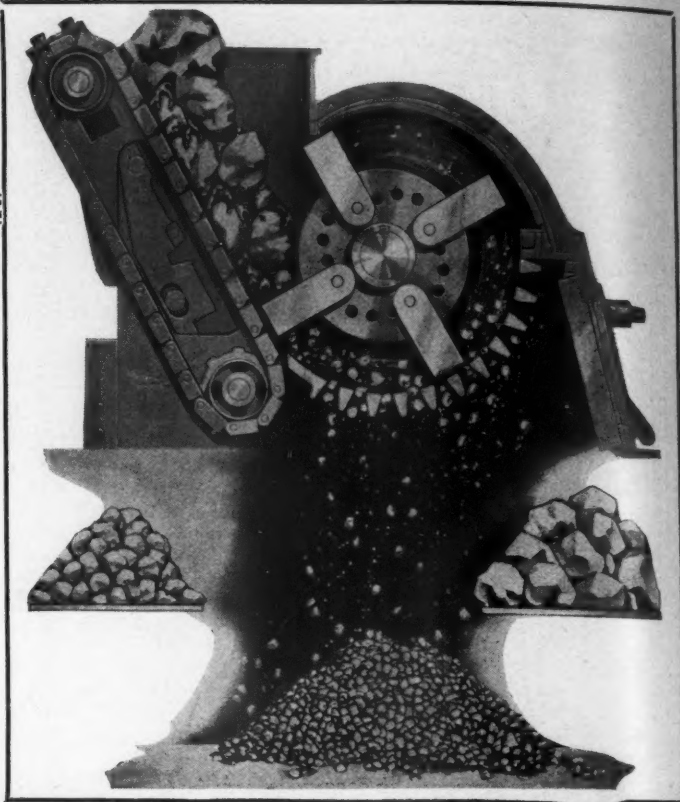
BLAW-KNOX

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Look at that design—power, efficiency, capacity, economy, all combined in this sturdy unit to result in more profitable production no matter how tough the crushing problem encountered. The breaker plate alone gives 26 times average wearing area—there is no clogging to contend with—no breakdown delays or excessive profit-eating upkeep costs. There are 40 sizes to choose from—in any capacity—Primary—Secondary or Fine Reduction.

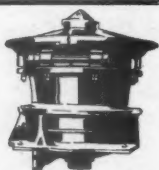


Ask for the latest crushing facts
as they apply to 1934 requirements!



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Complete
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EQUIPMENT
From Crushers to Bin Gates

Write today for
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TELSMITH

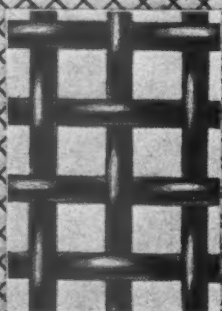
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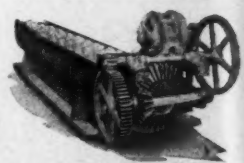
Foot of Belle St., St. Paul, Minn.



National Wire Cloth

LIMA
SHOVELS-CRANES-CLAMSHELLS-DAGLINES
3-4 yd., 1 yd., 11-4 yd., 11-2 yd. and 13-4 yd.
(A TYPE AND SIZE FOR EVERY JOB)
The Ohio Power Shovel Company
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stone when it can
be made clean easily
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This scrubber will do the good work.

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SIZES 10" x 7" to 72" x 34"

Complete Plants Designed and Equipped.
Screens, Elevators, Conveyors, Quarry,
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Single, Double Roll Crushers—Super Dry Pans—Steel Log Washers and Scrubbers—Dryers—Jigs—Screens—Hoists, Elevators and Conveyors—Reciprocating Feeders, Bins, Gates, Chutes, Turn Tables, Elevator Buckets, Car Pullers, Rail Straighteners, Cast Parts, Rough or Finished—Car Wheels and Brake Shoes, Sprockets and Sheaves, Gears and Bearings, Gratings and Columns, Chute Linings, Grate Bars of Special Heat-Resisting Metals.

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CHAIN BELT COMPANY
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Established 1891—Branches or Representatives in all Principal Cities

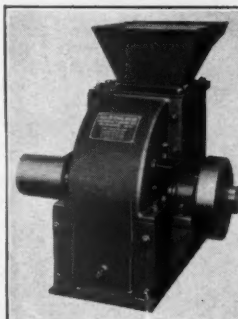
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● Cyclo Crusher Pulverizers are inexpensive. They are equipped with Timken Bearings, manganese steel hammers, fly wheel, cast steel breaker blocks and are completely lined with hard iron wearing plates. Capacities 1 to 25 tons per hour when crushing to 10 mesh or finer.

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PRODUCE HIGH STRENGTH AND ALL TYPES OF MASONRY

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All processes patented in U. S. and other countries.

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Single and Double
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Guaranteed removal of trash, sticks, leaves, coal, silt, mud-balls,—to the difficult clay-balls and iron oxide conglomerates.

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Installed in the largest Cement Plant in the British Empire. Five other plants of the same Company are "Pennsylvania" equipped.

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HAYWARD CUT DIGGING COST BUCKETS

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One 2' x 6' Tel-smith Single Deck Vibrating Screen with 2 H.P. General Electric Motor. Both of above in splendid condition.

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Marion Gas Electric 3/4-Yard Shovel. 1-Yd. Osgood Crawler Shovel, rebuilt. Side and Center dump cars. Locomotives—75-ton Switcher, code boiler—saddle tank type, 18 to 65 tons. Cranes and Draglines, various sizes.

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2—National Double Drum Electric Hoists, fitted with General Electric 60 H.P., 220 volt, 60 cycle, 3 phase motors, controllers and resistance grids. Will sell very cheap to quick purchaser.

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THE BUCKEYE MACHINE COMPANY,
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Sand and Gravel Bins with weighing batchers, 125 to 200 ton capacity.

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CONTRACTORS

FIRECLAY, ASPHALT, LIMESTONE,
COAL AND ALL MINERALS
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Try cloverine fertilizer all crops

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Our Industry
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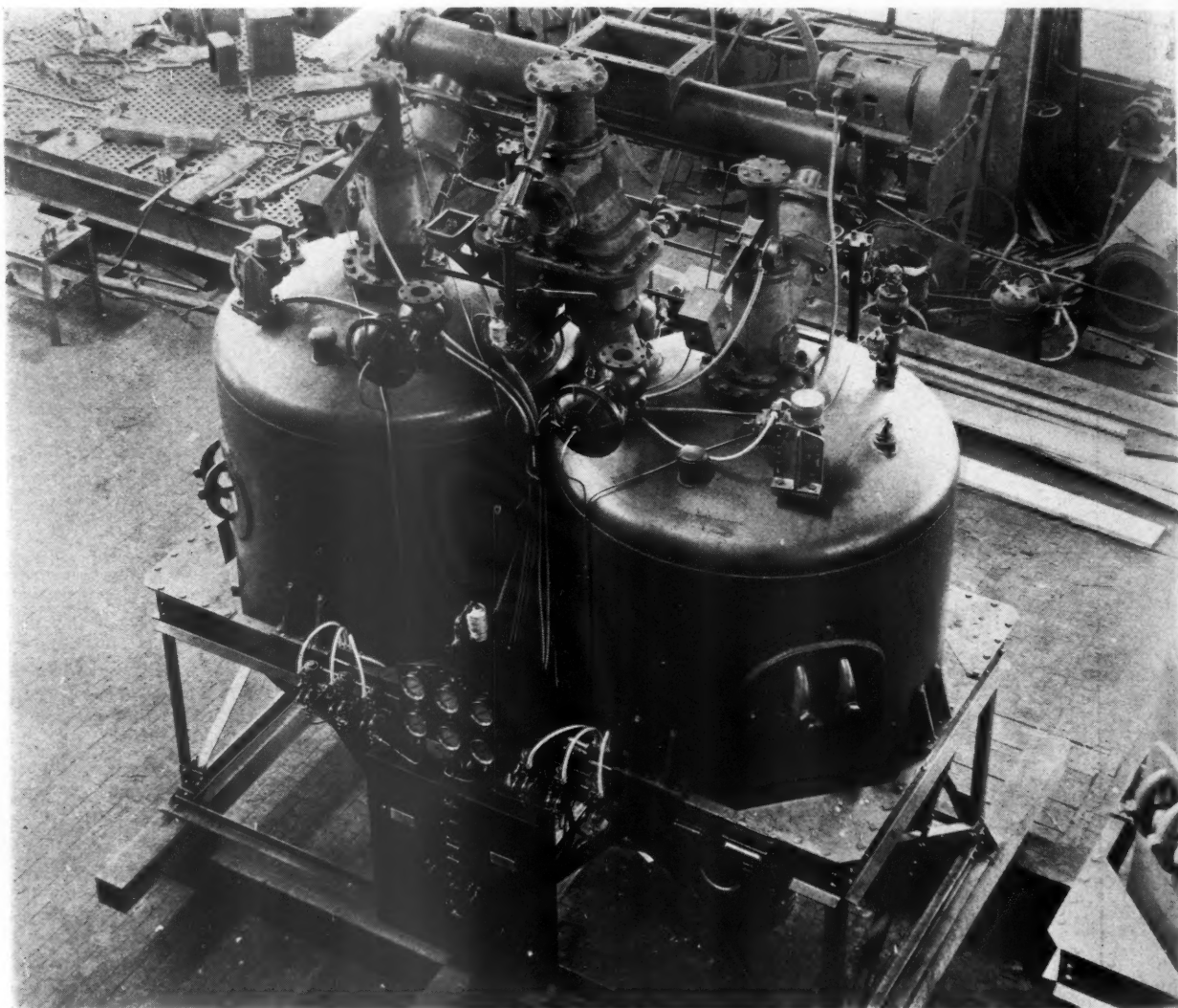
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FOR PNEUMATIC TRANSPORT

• The Fluxo Pump is transporting the Cement
at Boulder Dam more than one mile •



Automatic and flexible, low power consumption, minimum attention • No operating parts in direct contact with the moving material • Economically transports cement, pulverized dry cement raw mix, dry clay, gypsum, hydrated lime, phosphates, soda ash, etc.—from grinding mills to storage—dust collected at packing machines to silos—loading and unloading silos, storage bins, blending bins, etc. • Cheapens silo construction by elimination of tunnels and deck slab.

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F. L. SMIDTH & Co.

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